Prover Control Software Operating Manual

Contents
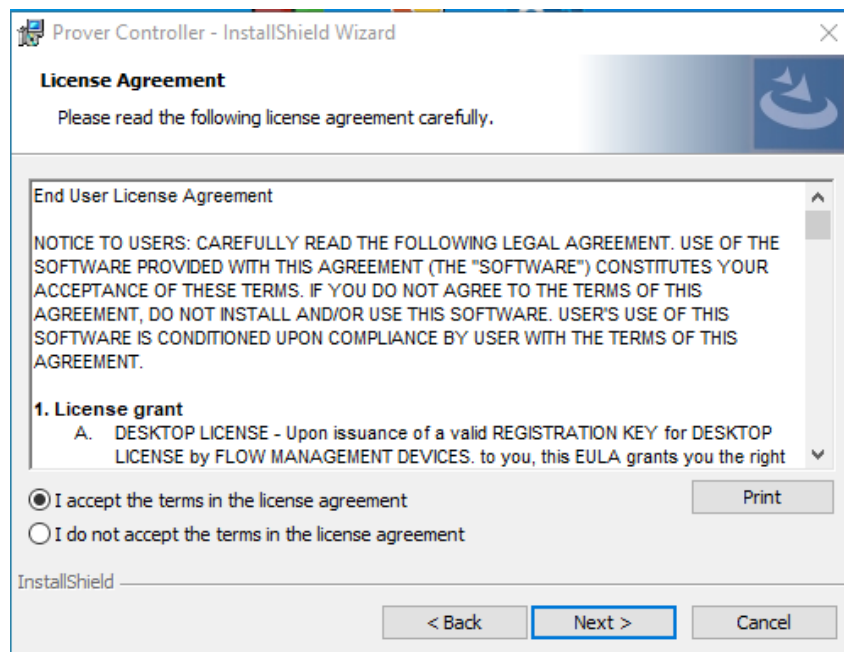
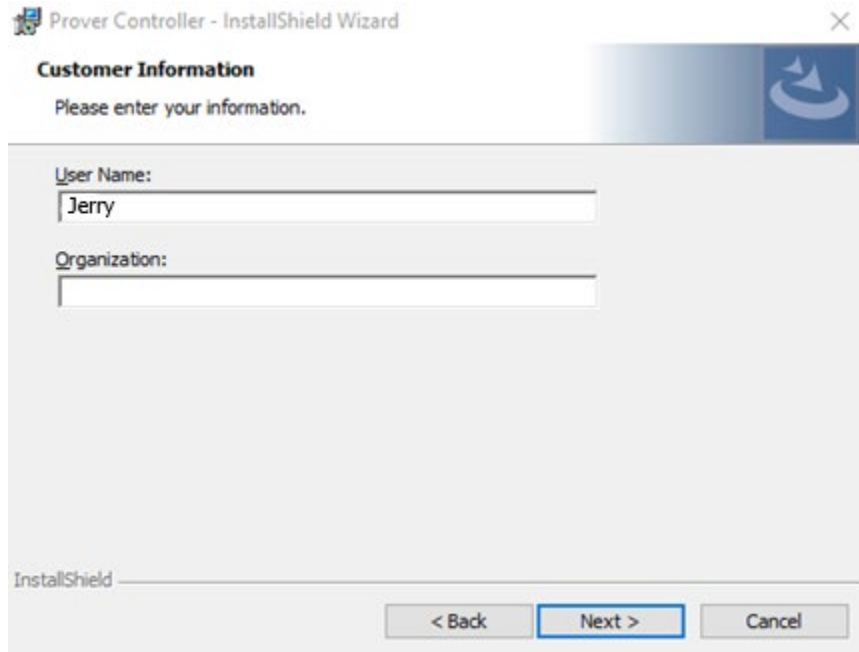# Installation

Locate the installation file on your computer. Double click the file to start the installation process.
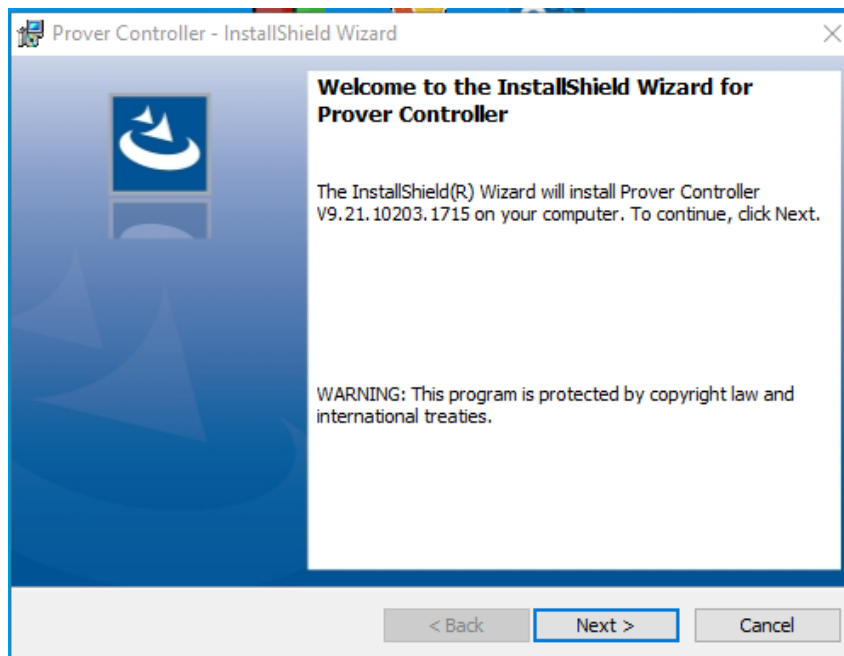
Click Next.

Click "I accept the terms in the license agreement" and then Next to continue.

Enter your name and organization if desired then click Next.
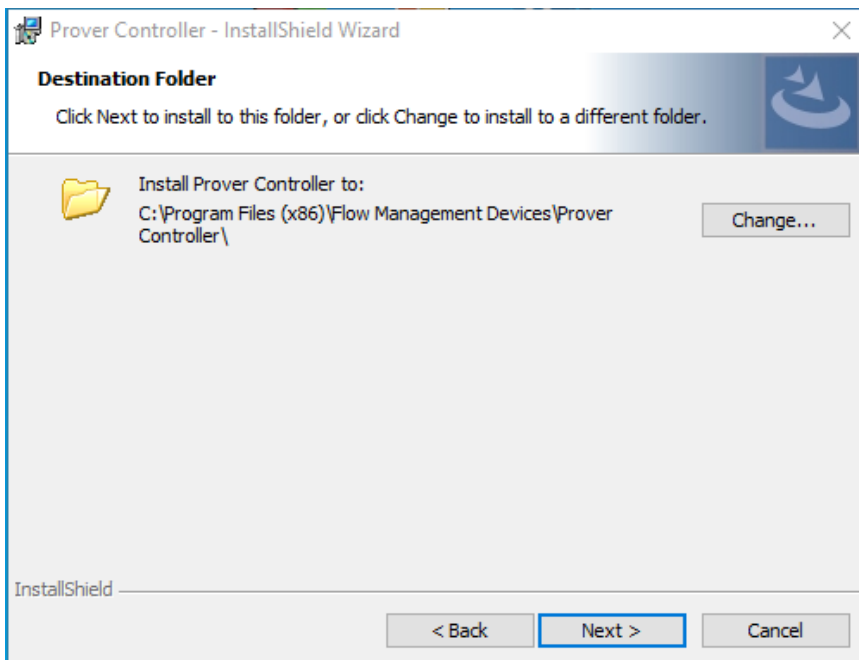
Click Next.
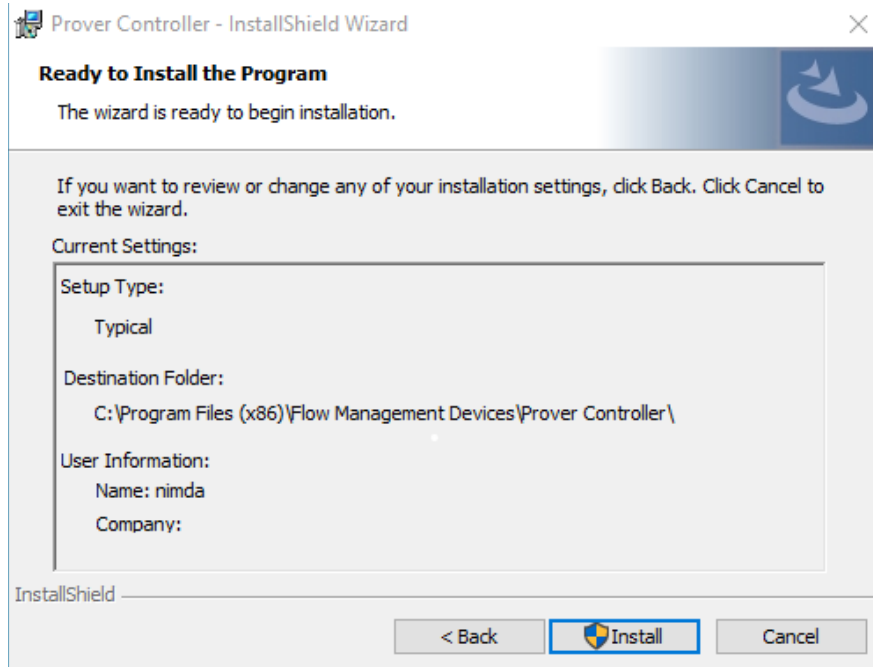
Click Install.

If you are greeted with this message, it is Ok to say Yes to continue the installation.
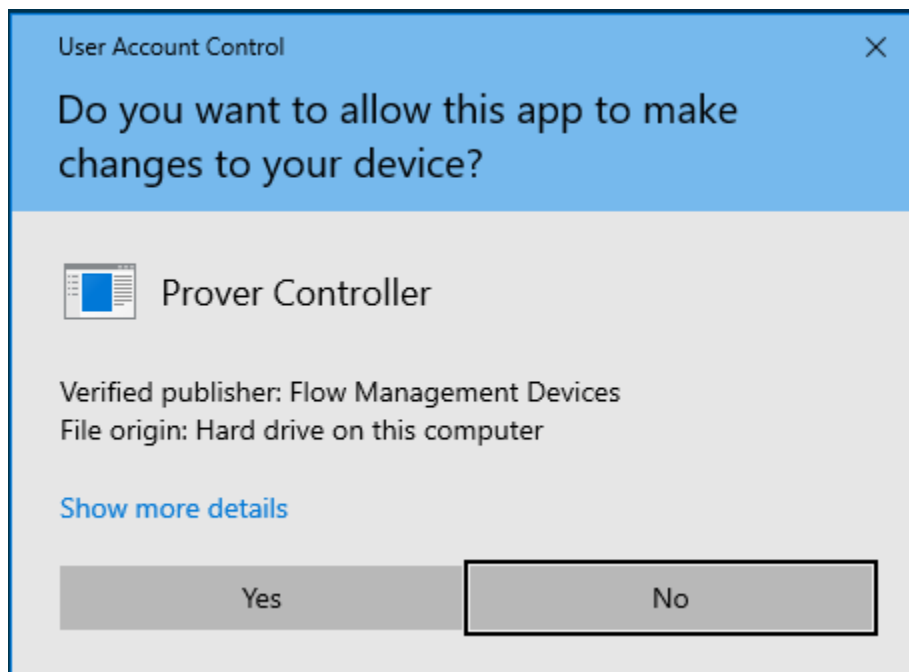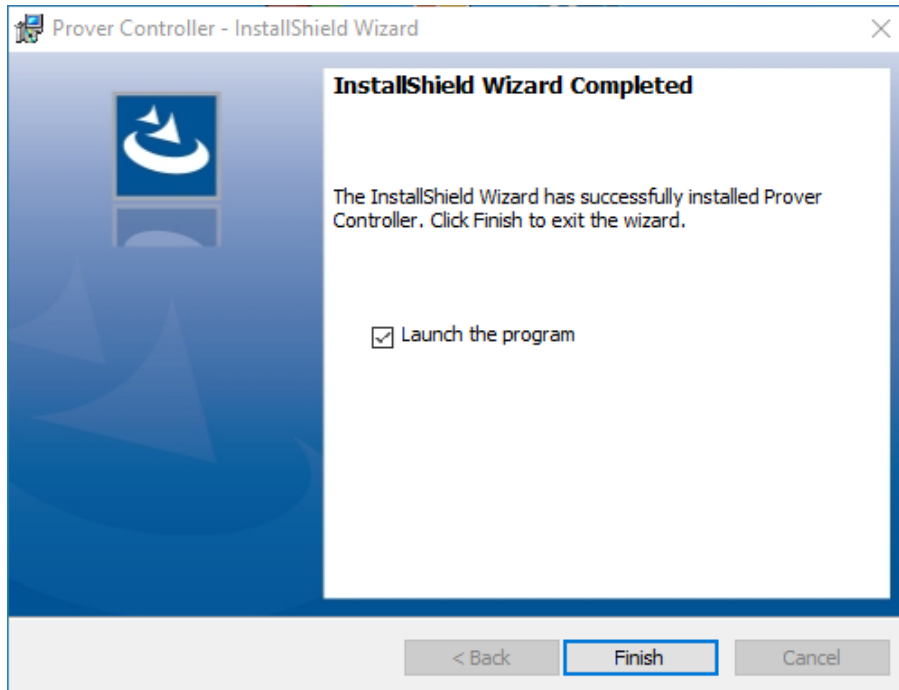
Click Finish to complete the installation of the program.

NOTE: The PCS program must be installed individually for each user that will access it. This can be accomplished by selecting "repair" as the installation method after the program is installed the first time on the PC.

Main Screen:

Once the Prover Control Software (PCS) is loaded, the main screen will consist of two tabs: Transmitter Explorer and Special Functions (as shown below)
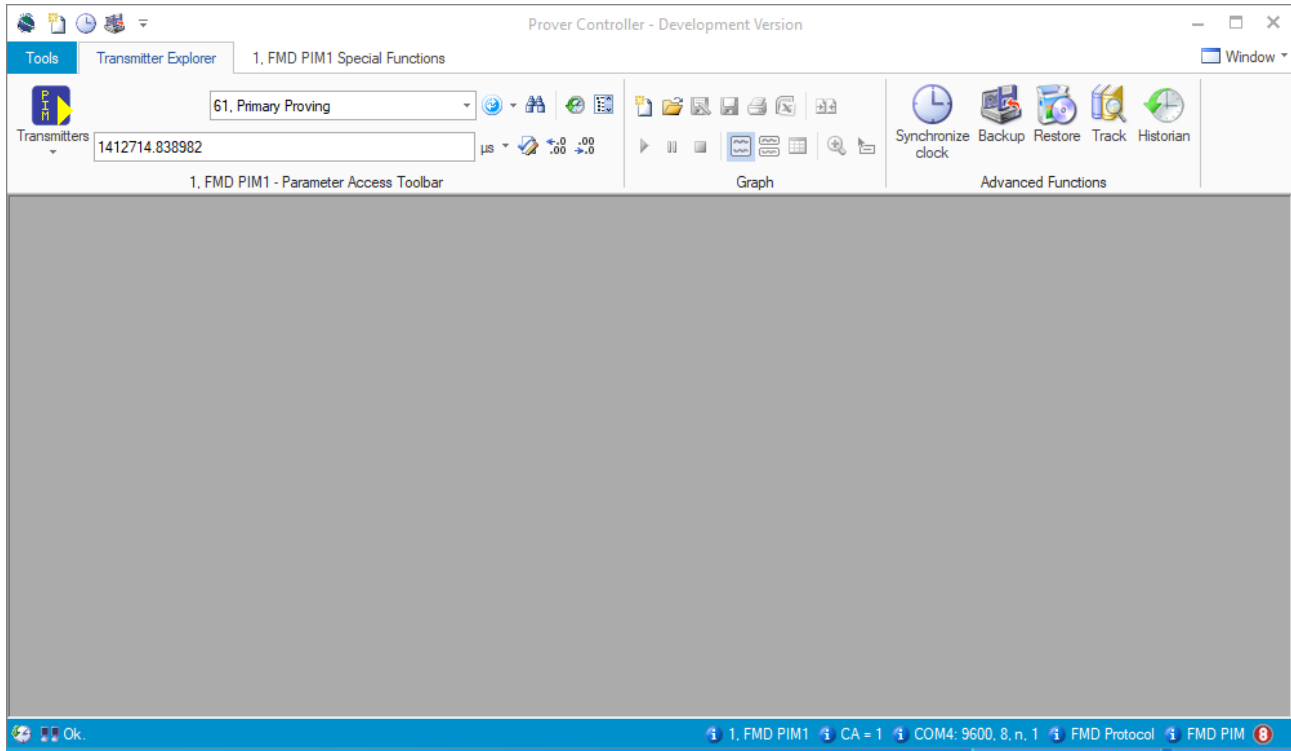
In the top right-hand Window - This icon shows the Windows that are open in the software.

Quick Access Toolbar - This is at the very top of the page next to the Flow Management Devices (Flow MD) logo and in line with the "Prover Control Software" heading. Clicking the small arrow will give options to move the toolbar below the ribbon or minimize the ribbon. This toolbar, as suggested by its name, enables the creation of a customized toolbar for ease of access and increased efficiency in operating the PCS software. To add items to the toolbar, right click the icon that you wish to add to the quick access toolbar in the main toolbar and select "Add to Quick Access toolbar." To remove items from the quick access toolbar, right click on the icon in the quick access toolbar and select "Remove from Quick Access Toolbar." Below is the picture of a toolbar which has been moved below the ribbon that has three icons added to it.

Status bar: The bottom left-hand corner of the screen shows the prover controller history.

If the PCS is in communication, the word "OK" will appear. Otherwise, it will show "No response from transmitter.

The bottom right-hand corner of the screen shows your connection details and status.
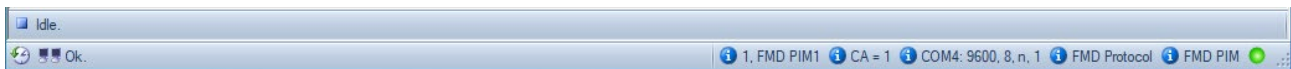
Tools Button
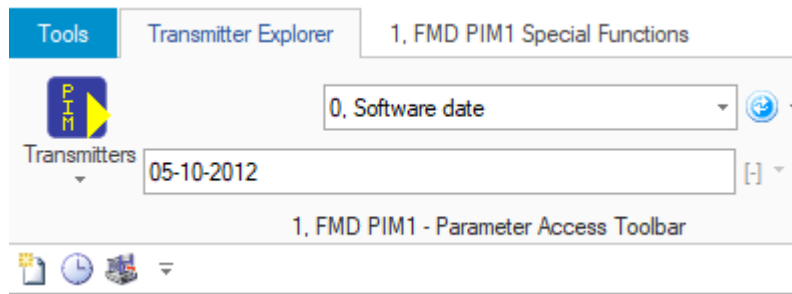
Tools: In the top left-hand corner of the screen there is a button labeled "Tools" that has more options.
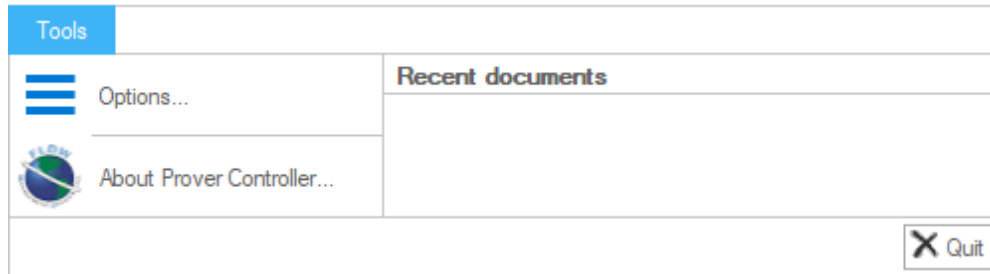
Options: Opens a window with general, appearance, and editor settings.
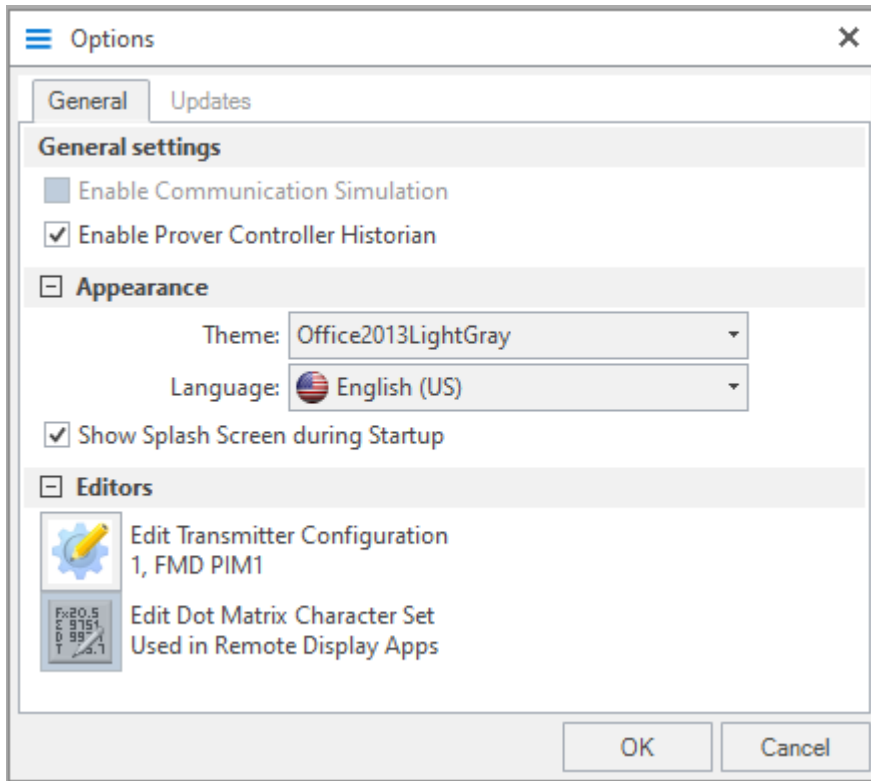
Edit Transmitter Configuration: From 'Options' Window under "Editors". This screen enables configuration of the transmitter which in this case is Flow MD Prover Interface Module (PIM).
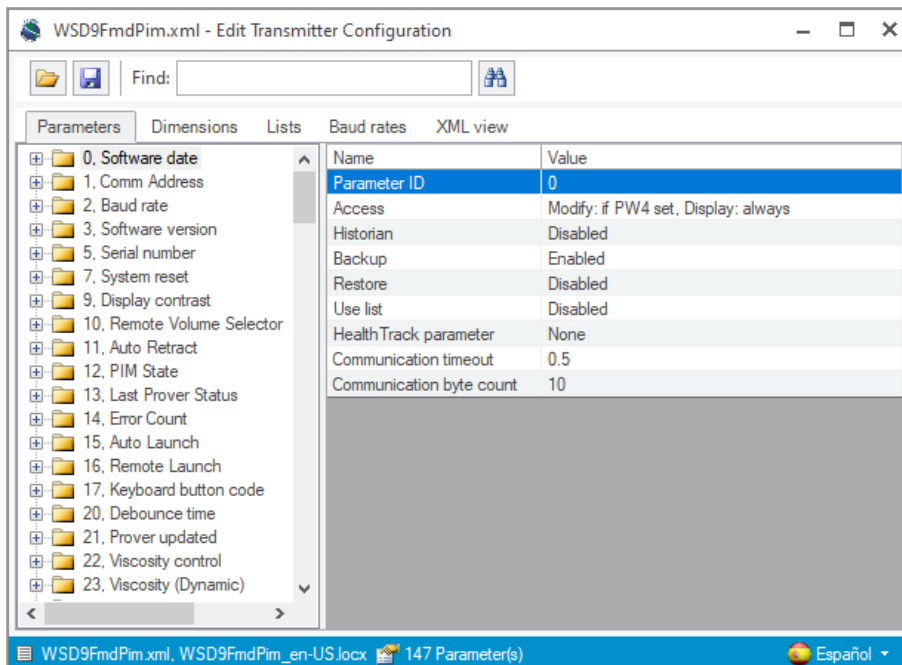
About Prover Controller Shows the software version details and the devices it can work with.
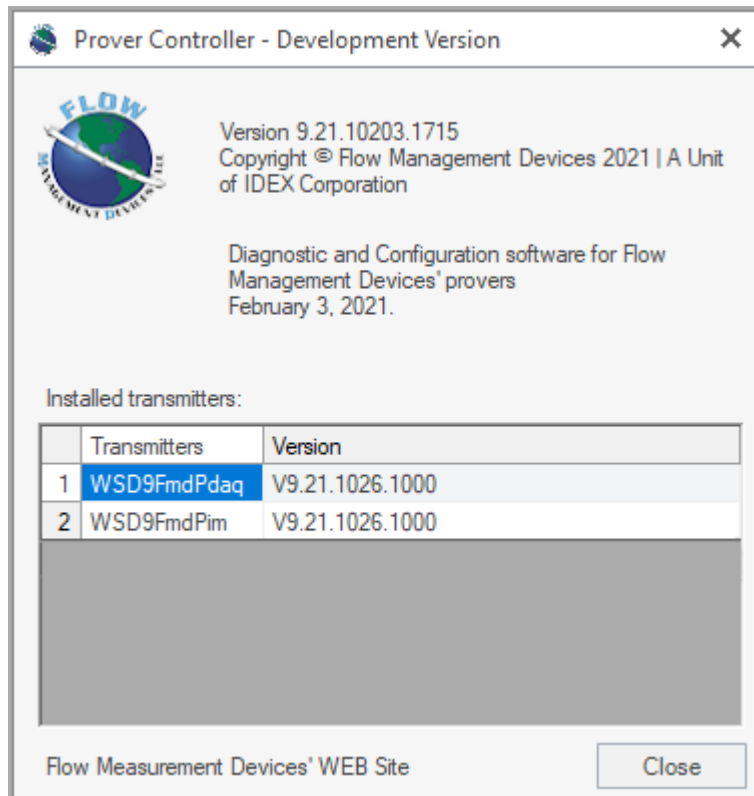
NOTE: The term transmitter refers to the device communicating with the PCS software such as a Prover Interface Module (PIM) or Prover Data Acquisition device (PDAQ).

Recent Documents: Beneath this title will be the list of all recent documents which have been saved.
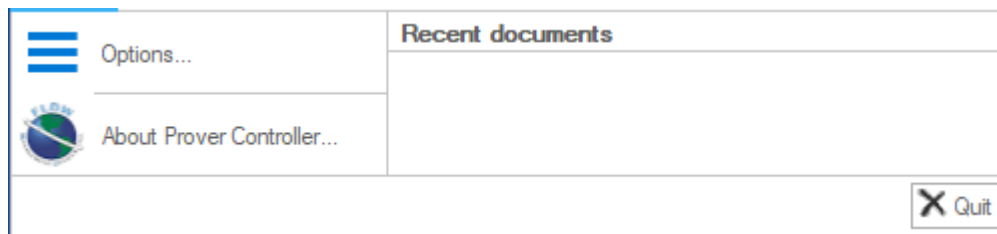
Transmitter Explorer Tab

PIM Parameter Access Toolbar

Transmitter ribbon: This ribbon, pictured below, is where most of the functionality of the transmitter is controlled from:
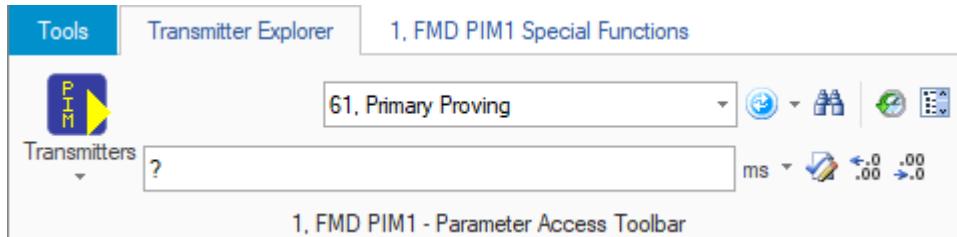
First Row starting from the left.

> **Transmitters:** Display, configure and work with the available transmitters.
>
> **Function Box:** Used to select the parameter to view or modify.
>
> **Read Item Value:** Used to select the parameter in the Function Box.
>
> **Find Item:** Typing in the Function Box and pressing this button can help find a parameter.
>
> **Show Communication history:** Shows a log of all connections to the transmitter.
>
> **Show Transmitter Browser:** Allows you to customize a list of parameters to view and modify.

Transmitters: Clicking on the lower part of this icon (on the word "Transmitters" where the small down arrow is) displays the list of transmitters to be selected as well as giving the opportunity to select Transmitter Manager menu item. Selecting this menu item will display the following window:

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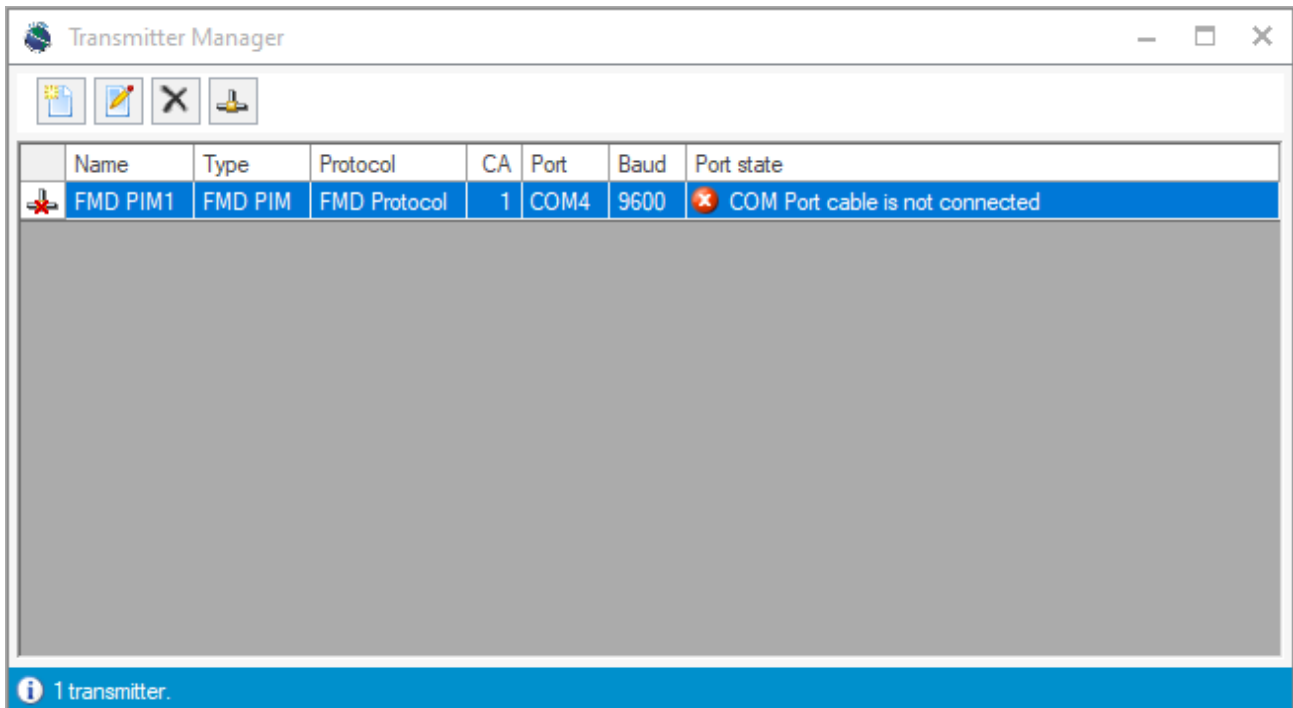
Double clicking on the name of one of the transmitters listed will display the Edit Transmitter window shown below:
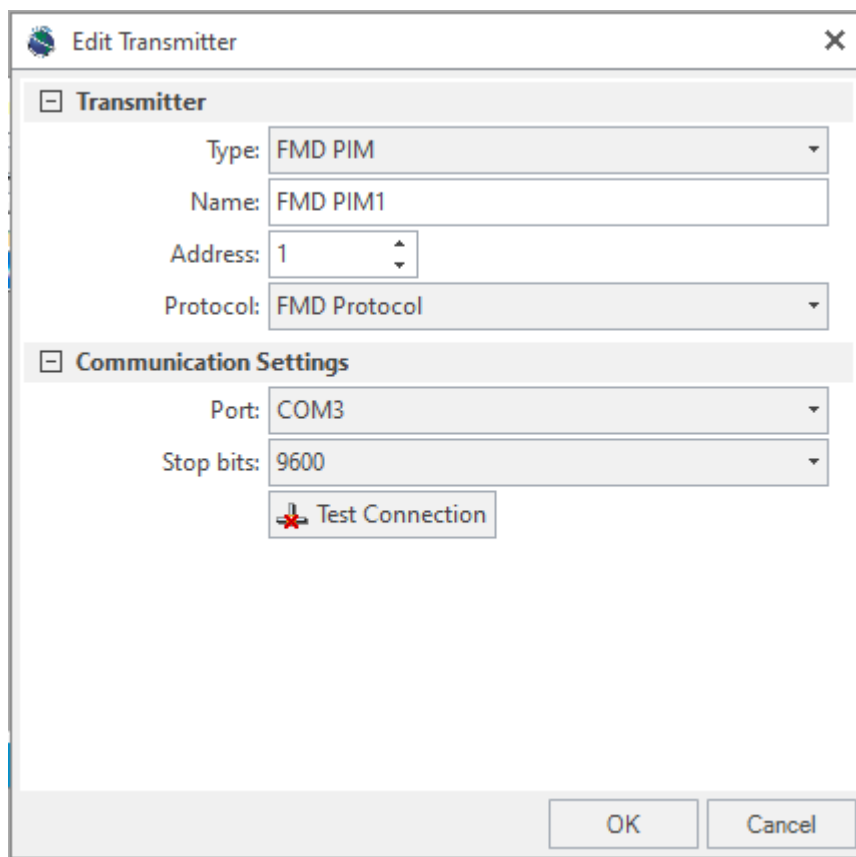
Using the Edit Transmitter window, you can change the name of the transmitter, select the type of transmitter, change the address, and choose the communication protocol used by the transmitter. Also, you can specify the communication settings, such as which port is communicating with the PC and at what speed. Once all these settings have been selected, you can test the connection between the PC and the transmitter by clicking on the Test Connection button.

NOTE: You can have multiple transmitters connected to one PC at the same time. This will be done by assigning each one a different address.

Function Box and Value Box

The most important part of the control system is the two drop down lists, positioned one above the other, in the Transmitter ribbon as pictured below:
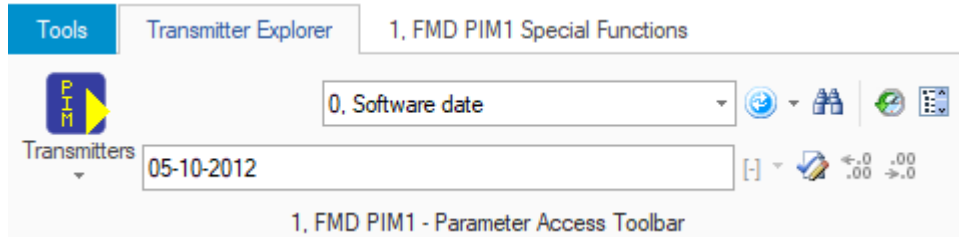
The box on top, currently showing "0. Software date", is the list of all functions and fields (from now on referred to as Function Box) that you can select values for or enter the desired values for. These functions are explained in detail in the PIM manual.

The lower box, currently showing "05-10-2012", (from now on referred to as Value Box) is where you can type in the value for the function selected in the Function Box or select one of the value options available for the parameter being displayed in the Function Box.

An example of a function and its setting is shown below. In this example, the PIM state has the following options: Initialization, Auto Retracting, Launch, Retracting, Measurement and Finished.
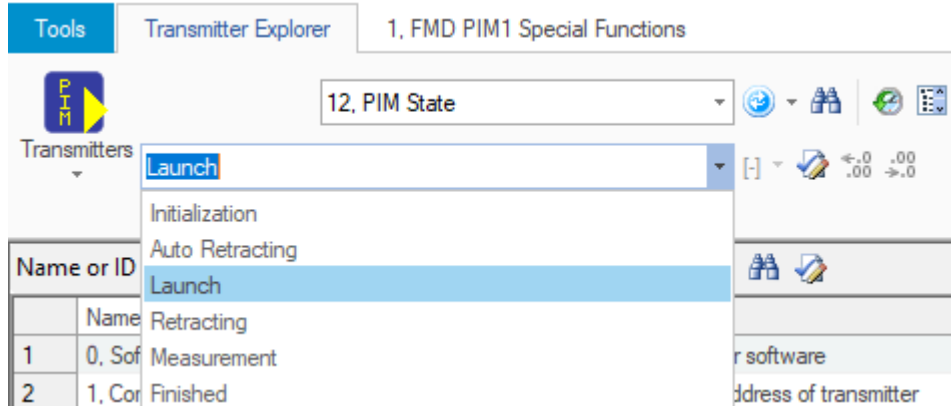
NOTE: In some cases, altering the value in the Value Box requires entering a password. If the operator does not have the correct security level, then the value cannot be altered.
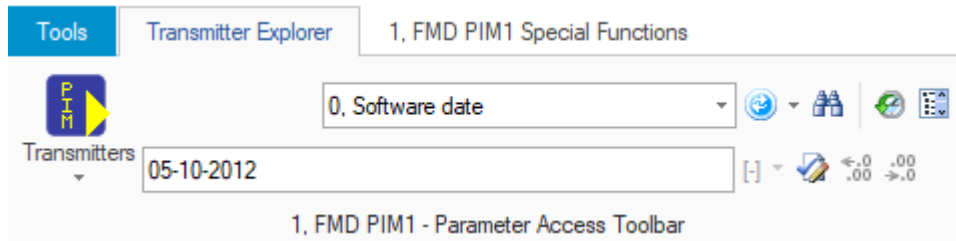
Blue circle with two arrows: This icon will refresh the Value Box content to reflect the value of the function selected in the Function Box.

Find Items: Selecting this icon will allow you, through the window shown below, to search for a function by its name. As soon as you start typing, the list will be filtered to reflect a possible function name matching your spelling. Typing a few letters will allow you to find the required function very quickly. To see all available functions, erase everything in the box and press the search button.

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Show Communication History: This icon does as the name suggests, i.e., shows communication history between the PC and the transmitter as shown below:

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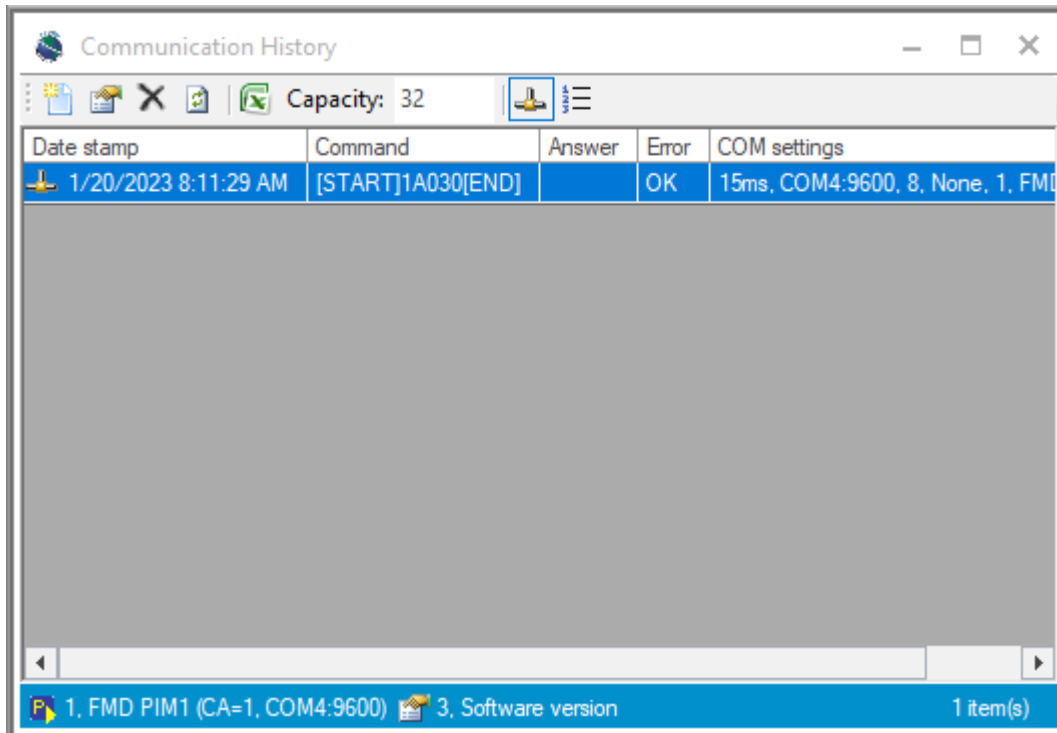
Transmitter Browser: Selecting Transmitter Browser will initiate a search for the connections to the PC and will display all the transmitters connected to the PC. Once the list of transmitters is displayed and connections are automatically updated to monitor the parameters of the transmitter. Below is the picture of the Browser showing one transmitter.
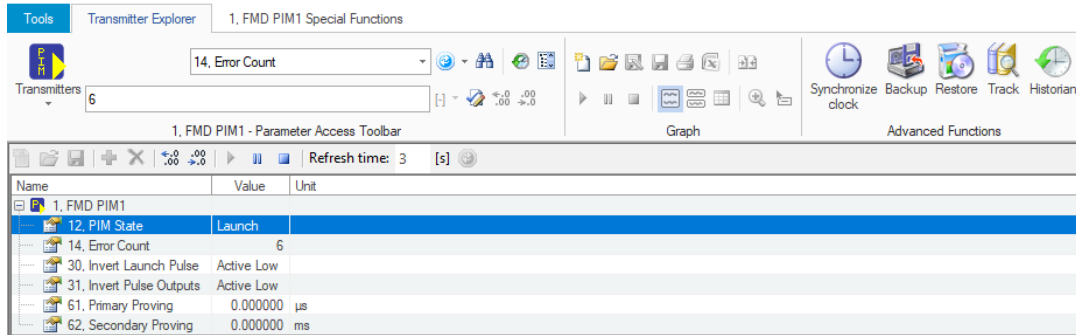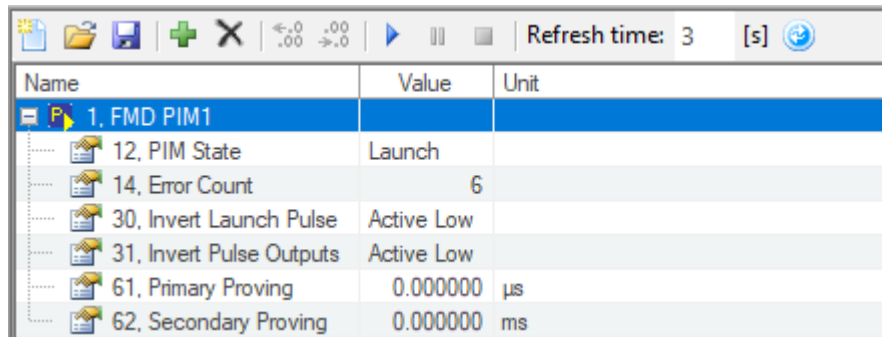
+ icon: you can add fields which you want to track the values by pressing the "+" icon and then:

1. Select individual field
2. Drag and drop that field into the right-hand column, as shown below.
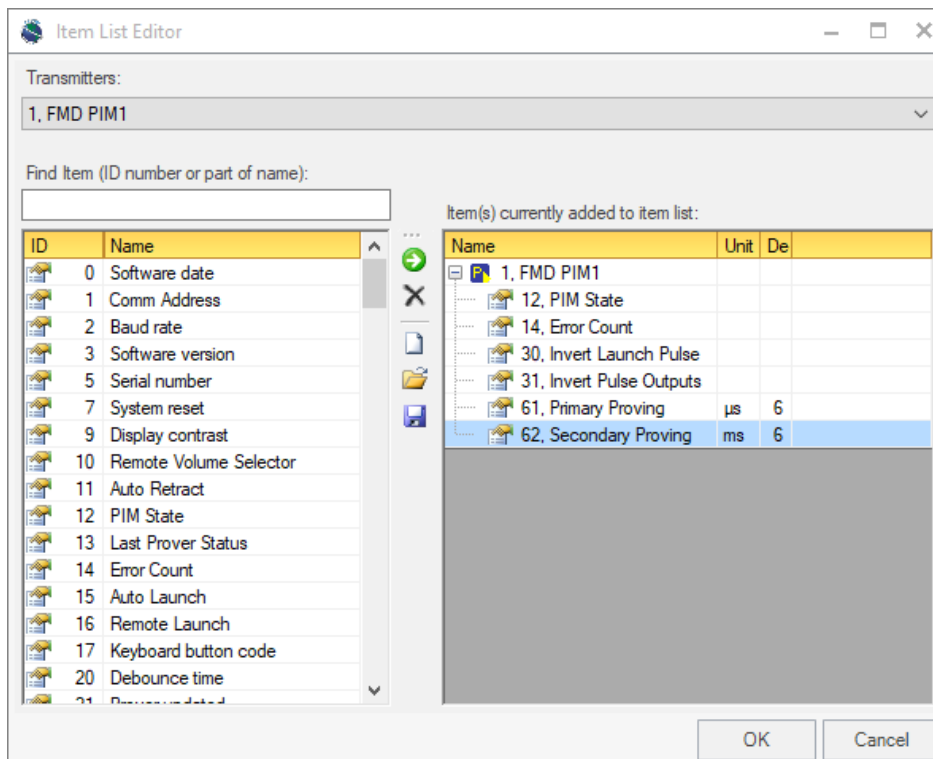
Once you have made your selections, pressing OK will result in your Transmitter Browser displaying your selections similar to the figure below.

Name	Value	Unit
⊟ P▶ 1, FMD PIM1		
12, PIM State	Launch	
14, Error Count	6	
30, Invert Launch Pulse	Active Low	
31, Invert Pulse Outputs	Active Low	
61, Primary Proving	0.000000	µs
62, Secondary Proving	0.000000	ms

Start auto refresh: (blue arrow in the middle of toolbar) the system will start capturing the selected data at the time intervals selected, which will be displayed in "Refresh Time". This format and the log can now be saved for further analysis.
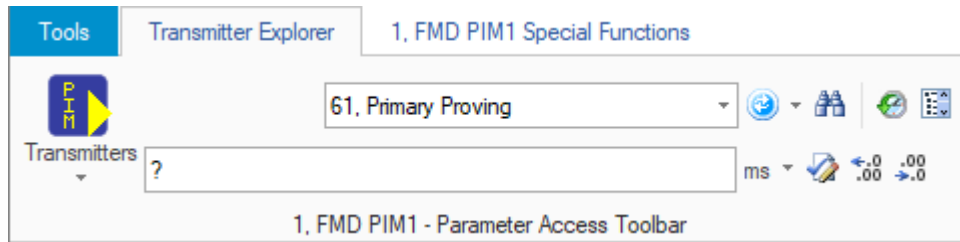
Bottom row: From left to right after the Value Box:

Engineering units: The first icon immediately to the right of the Value Box shows the measurement unit of the value displayed in the Value Box e.g., "VOL1_OUT pulse width" is measured in milliseconds, therefore the icon will display "ms".

Modify Icon Value (Icon with a blue tick): Allows you to modify the value in the Value Box, assuming that the correct authority has been provided by issuing the required password (required dependent on the function for which the value is being modified).

Increment number of decimals: Pressing this icon will increase the display accuracy of the value by one more decimal point.

Decrement number of decimals: Pressing this icon will decrease the display accuracy of the value by one less decimal point.

Graph

Graph ribbon: The Graph ribbon is displayed below:

Top row of the Graph ribbon will provide the following functions:

New Graph: will create a new graph.

Open Graph: will open an existing saved graph.

Save Graph As: will allow you to save the graph with a new name in your desired location on the hard disk.

Save Graph: will save the current graph using the original name, i.e. will save the latest version of the graph overwriting the existing file with the same name.

Print Graph: will print the current graph.

Export data to Excel: will allow you to save the captured data for your graph to an Excel spreadsheet anywhere on your hard disk.

Restore Original Layout: This icon will restore all the changes you have made to their original state.

The icons in the bottom row of the Graph ribbon have the following functions, respectively:

Start Data Logger: Starts the Data Logger.

Pause Data Logger: Pauses the Data Logger.

Stop Data Logger: Stops the Data Logger.

Single Graph: Displays the data on a single graph.

Dual Graph: Displays the data on two graphs.

Data view: Show the data in a tabular format.

New Graph icon at the top left of the ribbon will start the graph wizard, which is shown below:
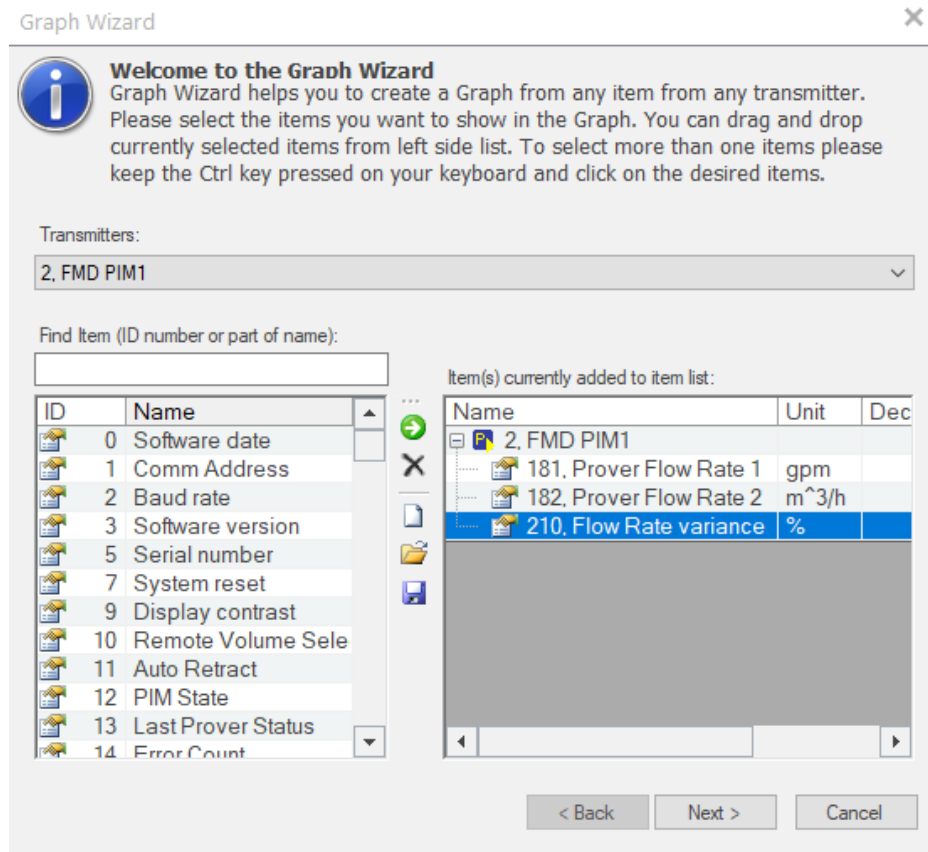
Once the above screen is displayed, select the fields that the graph needs to display (one by one), then drag and drop the field in the column on the right-hand side. Once you have selected all the desired fields, press the Next button to progress to the next screen shown below:
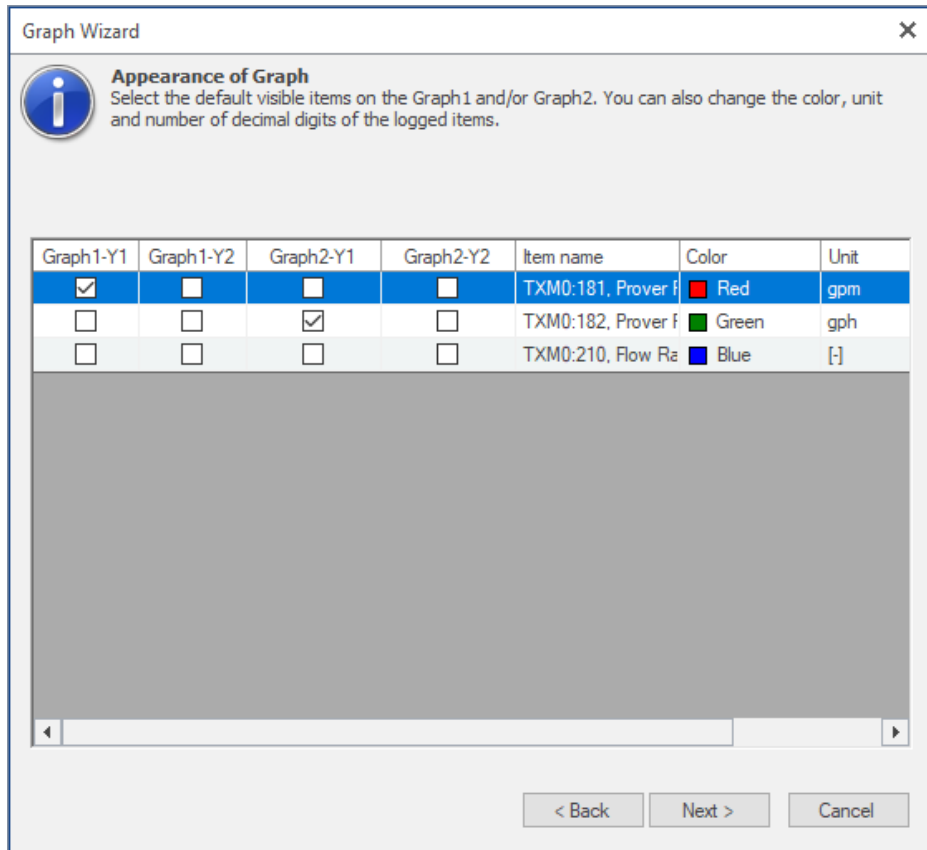
In this screen select the fields that you want to display in the first graph and the fields that need to be displayed in the second graph.

NOTE: By clicking in the column for Color in each line you can select the color for that field in your graph.

Once you are ready to move on, click on the Next button for the following screen:

On this screen you can select the Mode which will allow you to graph between two set dates and times or capture the data now using "Free run". You can also append the data you are about to capture to an existing file i.e., continue with previous file or start a new file. Also, you can start the data logger automatically when exiting this wizard by clicking the Finish button.

Closing the wizard will display one of the following two screens, depending on your choice to display one or two graphs:
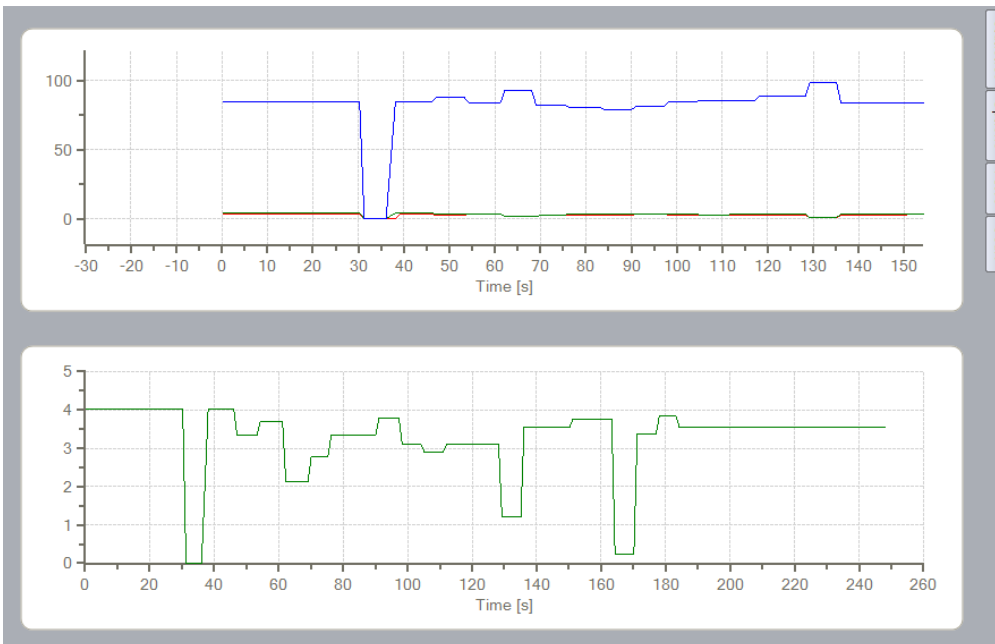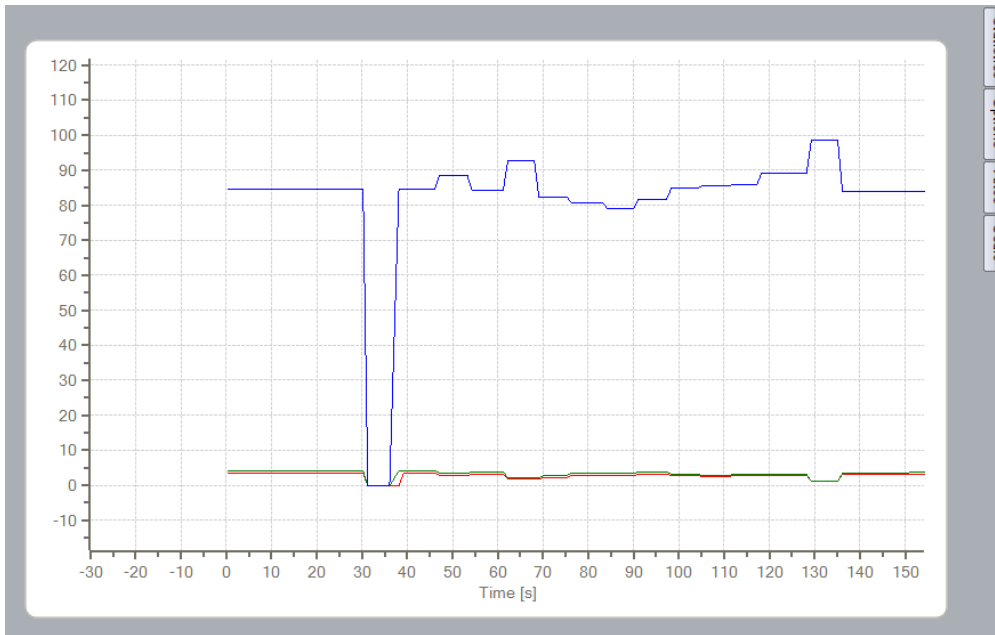
You will notice, on the right bottom corner of the graph window there is a "Tip" area with a small icon "i". Hovering the cursor over the "i" will reveal several tips for manipulating the graphs. Also, on the right edge of the window you will notice the following tabs: Statistics, Options, Axes and Scale.

Statistics: Selecting any one of the options will display that option on the graph. For example, selecting "minimum" will draw a horizontal line showing the minimum value. Where you have two graphs showing, these options will be available for each graph independently.

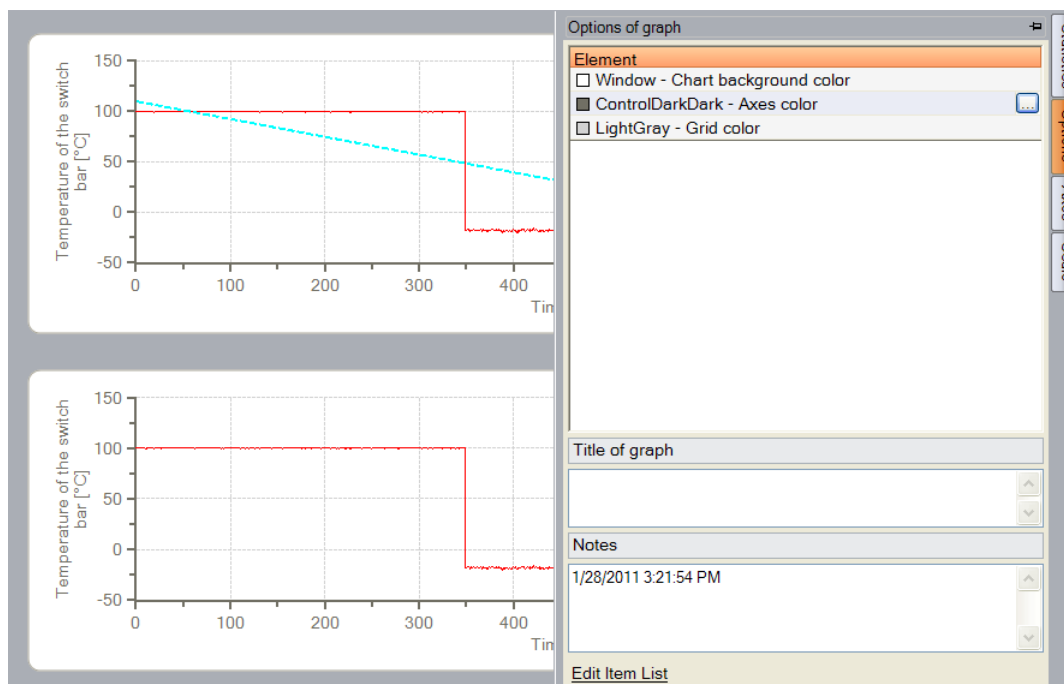| Sample	Time	181, Prover Flow Rate 1	182, Prover Flow Rate 2	2
	[s]	m^3/m	m^3/m	
1	0.344	3.3955497741699219	4.0123291015625	
2	1.031	3.3955497741699219	4.0123291015625	
3	2.062	3.3955497741699219	4.0123291015625	
4	3.094	3.3955497741699219	4.0123291015625	
5	4.125	3.3955497741699219	4.0123291015625	
6	5.156	3.3955497741699219	4.0123291015625	
7	6.187	3.3955497741699219	4.0123291015625	
8	7.219	3.3955497741699219	4.0123291015625	
9	8.250	3.3955497741699219	4.0123291015625	
10	9.281	3.3955497741699219	4.0123291015625	
11	10.312	3.3955497741699219	4.0123291015625	
12	11.000	3.3955497741699219	4.0123291015625	
13	12.031	3.3955497741699219	4.0123291015625	
14	13.062	3.3955497741699219	4.0123291015625	
15	14.094	3.3955497741699219	4.0123291015625	
16	15.125	3.3955497741699219	4.0123291015625	
17	16.156	3.3955497741699219	4.0123291015625	
18	17.187	3.3955497741699219	4.0123291015625	
19	18.219	3.3955497741699219	4.0123291015625	
20	19.250	3.3955497741699219	4.0123291015625	
21	20.281	3.3955497741699219	4.0123291015625	
22	21.312	3.3955497741699219	4.0123291015625	
23	22.000	3.3955497741699219	4.0123291015625	
24	23.031	3.3955497741699219	4.0123291015625	
25	24.062	3.3955497741699219	4.0123291015625	
26	25.094	3.3955497741699219	4.0123291015625	
27	26.125	3.3955497741699219	4.0123291015625	

Statistics of selected axis

PIM(1): 181, Prover Flow Rate 1, m^3/m

Visible	Name	Value
	Average	2.7623
	Range	3.3955
☐	Minimum	0.0000
☐	Maximum	3.3955
	StdDev	0.7052
☐	Slope	-0.0042527
	Offset	3.0932

PIM(1): 182, Prover Flow Rate 2, m^3/m

Visible	Name	Value
☐	Average	3.3712
	Range	4.0123
☐	Minimum	0.0000
☐	Maximum	4.0123
	StdDev	0.7413
☐	Slope	0.00072277
	Offset	3.2488

(Side tabs: Statistics, Options, Axes, Scale)

Options: Selecting the options tab will look like the image below.

Selecting any of the lines in the options screen will provide you with the opportunity to choose the colors you desire for your graph. Pressing the file icon on the selected line will provide you with the following screen for you to select your desired colors.
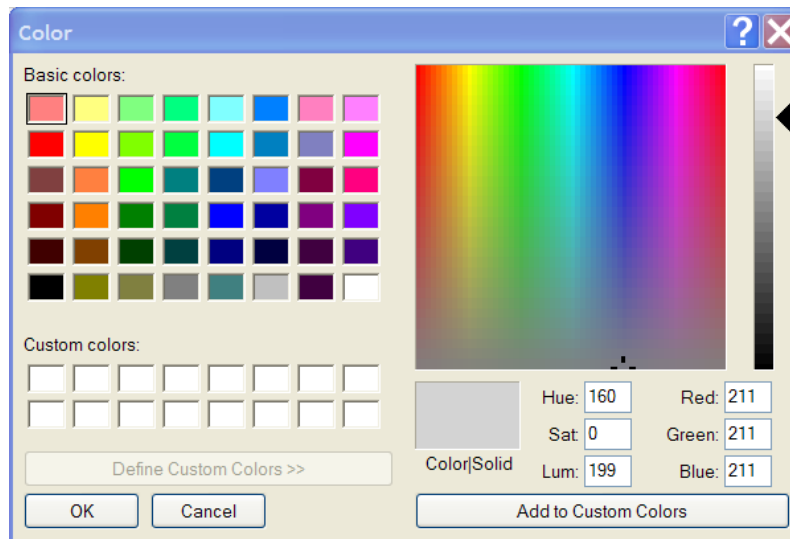
Axes: The Axes tab, shown below, will allow you to choose the color of the graph line, using the same color selection screen as above.

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Scale: Selecting the Scale tab will display the following screen and will allow you to either scale the graph manually or select the Autoscale option.

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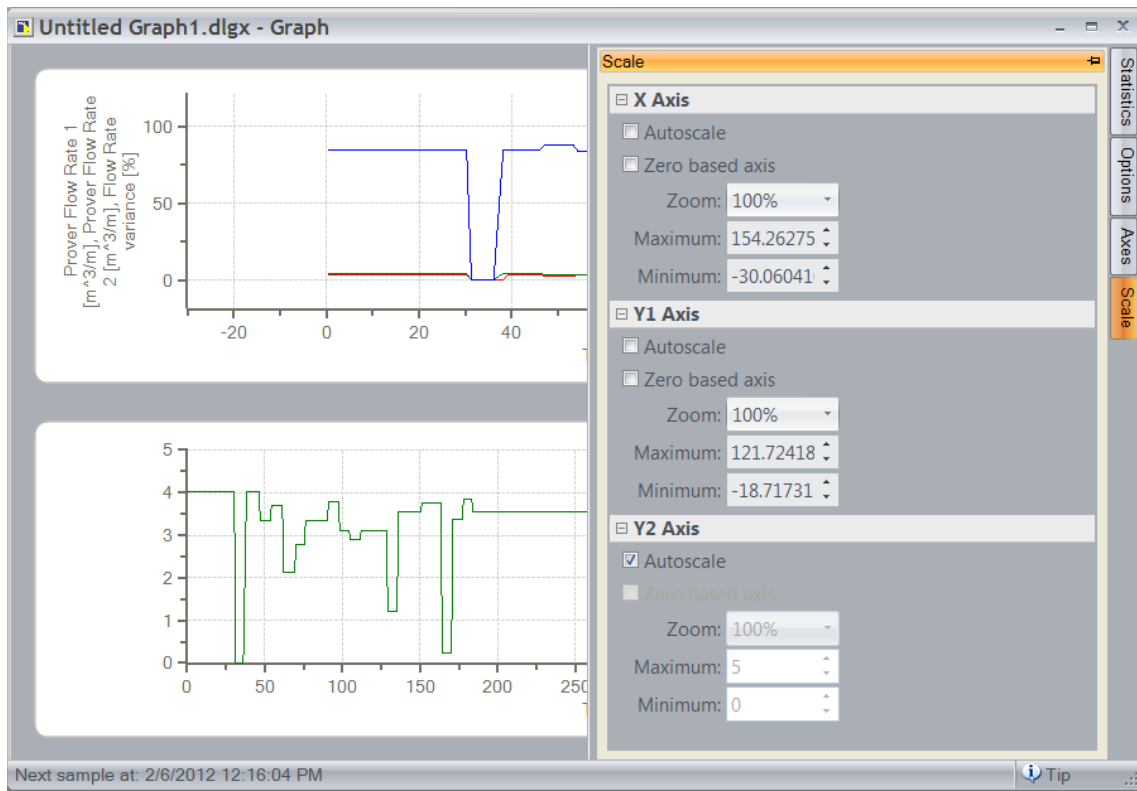
Data view is shown below:

Sample	Time [s]	181, Prover Flow Rate 1 m^3/m	182, Prover Flow Rate 2 m^3/m	210, Flow Rate variance %
1	0.344	3.3955497741699219	4.0123291015625	84.627891540527344
2	1.031	3.3955497741699219	4.0123291015625	84.627891540527344
3	2.062	3.3955497741699219	4.0123291015625	84.627891540527344
4	3.094	3.3955497741699219	4.0123291015625	84.627891540527344
5	4.125	3.3955497741699219	4.0123291015625	84.627891540527344
6	5.156	3.3955497741699219	4.0123291015625	84.627891540527344
7	6.187	3.3955497741699219	4.0123291015625	84.627891540527344
8	7.219	3.3955497741699219	4.0123291015625	84.627891540527344
9	8.250	3.3955497741699219	4.0123291015625	84.627891540527344
10	9.281	3.3955497741699219	4.0123291015625	84.627891540527344
11	10.312	3.3955497741699219	4.0123291015625	84.627891540527344
12	11.000	3.3955497741699219	4.0123291015625	84.627891540527344
13	12.031	3.3955497741699219	4.0123291015625	84.627891540527344
14	13.062	3.3955497741699219	4.0123291015625	84.627891540527344
15	14.094	3.3955497741699219	4.0123291015625	84.627891540527344
16	15.125	3.3955497741699219	4.0123291015625	84.627891540527344
17	16.156	3.3955497741699219	4.0123291015625	84.627891540527344
18	17.187	3.3955497741699219	4.0123291015625	84.627891540527344
19	18.219	3.3955497741699219	4.0123291015625	84.627891540527344
20	19.250	3.3955497741699219	4.0123291015625	84.627891540527344
21	20.281	3.3955497741699219	4.0123291015625	84.627891540527344
22	21.312	3.3955497741699219	4.0123291015625	84.627891540527344
23	22.000	3.3955497741699219	4.0123291015625	84.627891540527344
24	23.031	3.3955497741699219	4.0123291015625	84.627891540527344
25	24.062	3.3955497741699219	4.0123291015625	84.627891540527344
26	25.094	3.3955497741699219	4.0123291015625	84.627891540527344
27	26.125	3.3955497741699219	4.0123291015625	84.627891540527344

Untitled Graph1.dlgx - Graph

Next sample at: 2/6/2012 12:12:20 PM

Tip

Advanced function ribbon

The Advanced Functions ribbon, as pictured below, has four icons in it: Synchronize, backup, Restore and Track.

Synchronize: Clicking on this icon will synchronize the transmitter time and date with the PC running the PCS software.

Backup: This icon creates backup of any item from any transmitter.

Restore: This icon restores a backup from your local drive.

Track: Tracks parameters in the transmitter.

Historian: Displays the transmitter log files.

Synchronize:
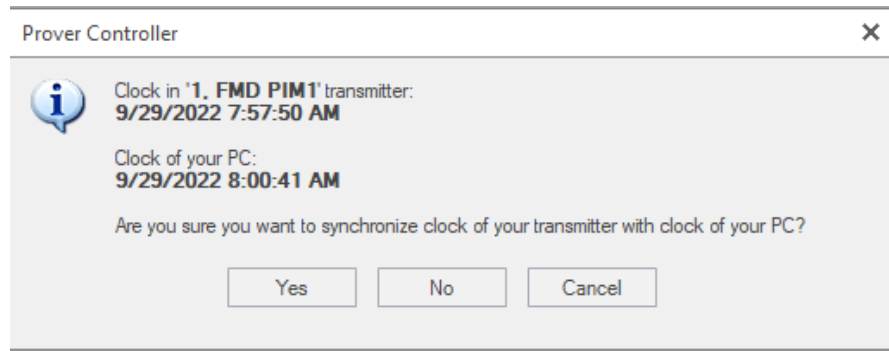
Backup: This icon creates backup of any item from any transmitter. Clicking on this icon initiates backup wizard as shown below:
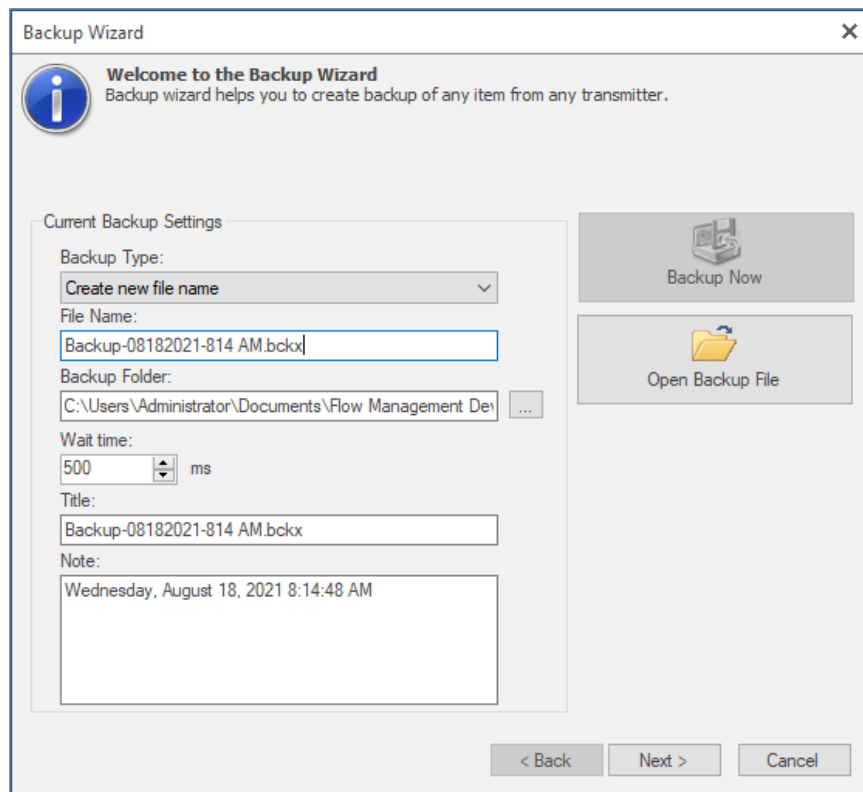
As can be seen this wizard will assist in creating a new backup file or overwriting an existing file. The wizard also allows the operator to locate the file anywhere within the file system. Clicking the Next button will progress the wizard to the following screen:
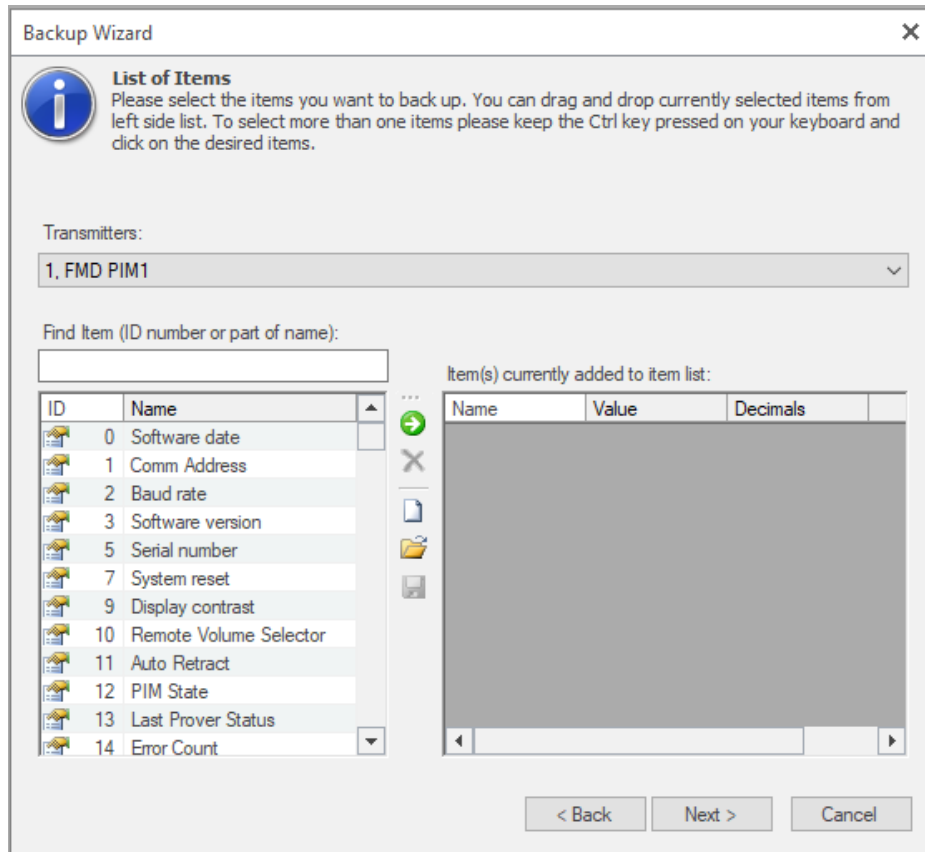
The above screen allows you to select specific bits of information that you want to backup. This is done by first selecting the data item you want to backup and then dragging the selected field to the right-hand column. The box titled "Transmitters" will allow you to choose which transmitter to back-up the information from, assuming availability of multiple transmitters.

Once the field selection is completed, clicking on the Next button will advance to the following screen:
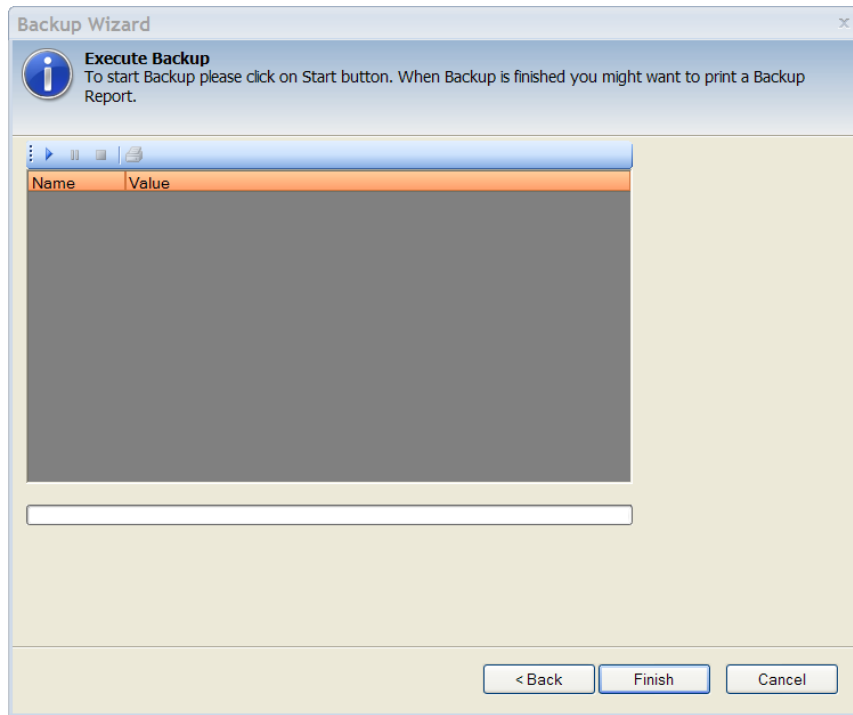
On this screen clicking on the "Start Backup Items" icon will start the back up. This icon is at the top of the box just above the "Name" column. Next to this icon there are icons for "Pause", "Stop" and "Print Report" for performing the stated operations.

NOTE: For the backup operation to work, the transmitter (e.g., PIM) needs to be connected and in communication with the PCS software.

Restore: Clicking on the "Restore" icon will initiate the restore wizard which will look like the following picture:

Restore Wizard   x

Welcome to the Restore Wizard
Restore wizard helps you to restore items from a previously saved backup file.

Current Restore Settings

Restore Mode:
Restore Items

File Name:
Backup-07232011-848 AM.bckx

Restore Folder:
C:\Documents and Settings\Administrator\My D

Wait time:
500   ms

Title:

Note:

Restore Now

Open Backup File

< Back   Next >   Cancel
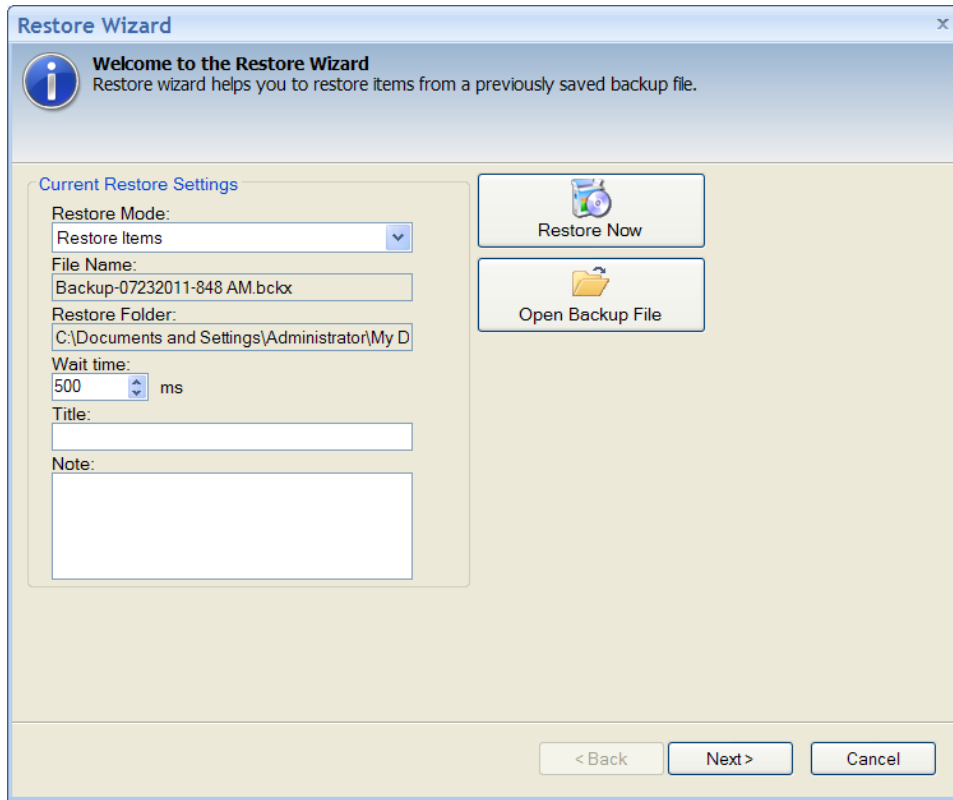
This wizard operates very much like the backup wizard. It allows opening an existing backup file from any location on your hard disk. When you select "Next" the wizard will display the following screen:
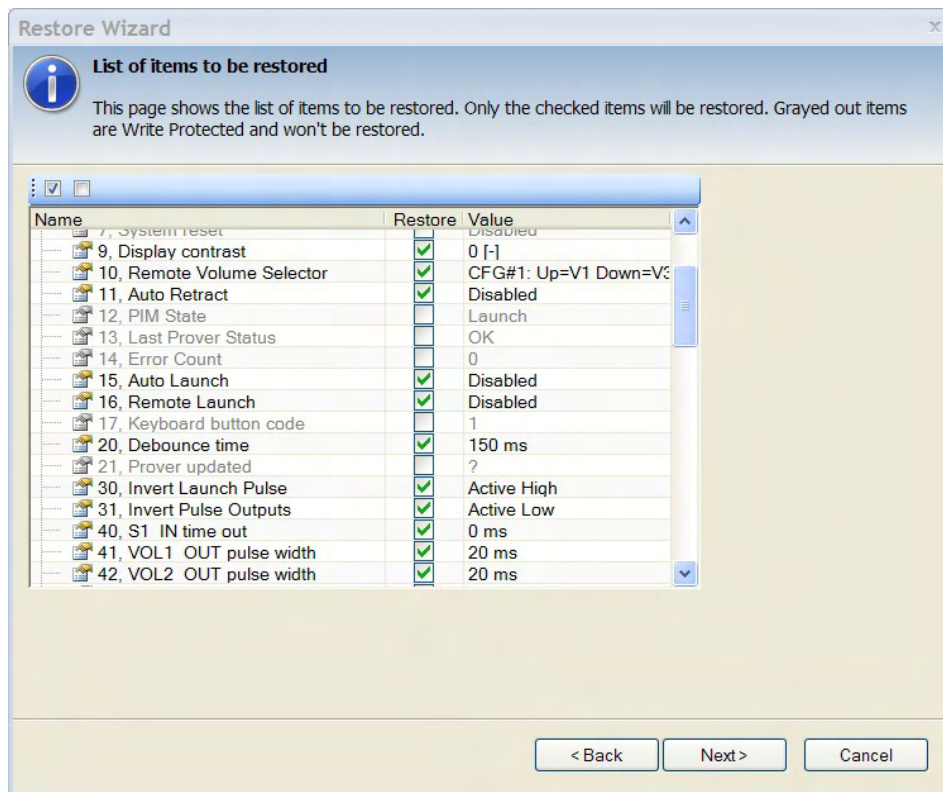
This screen allows the operator to select which fields of data need to be restored. As can be seen above, some fields are "greyed out" and are not selectable. The remaining fields are all selected and the operator can select which specific fields need to be restored.

Clicking on the "Next" button will progress the wizard to the following screen:
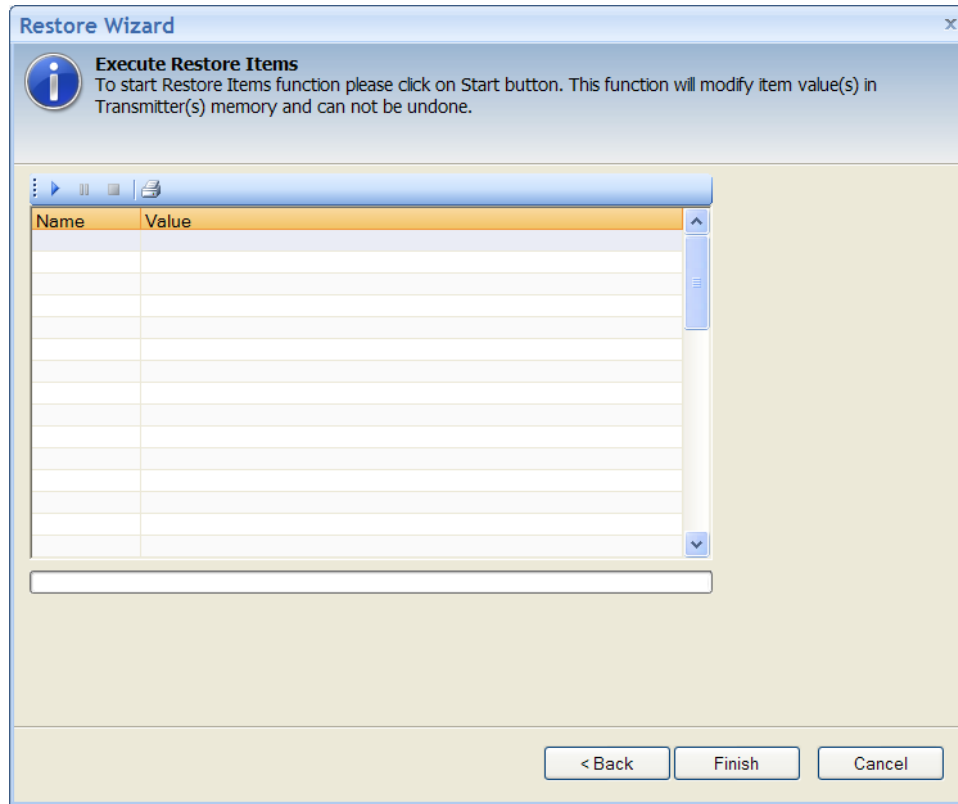
Once again, just like the backup wizard, this screen provides "Start Restore Items", "Pause Restore Items", "Stop Restore Items" and "Print Report" icons performing the stated functions.

NOTE: For the restore operation to work, the transmitter (e.g., PIM) needs to be connected and in communication with the PCS software.

Track

Clicking the Track icons will bring up the following screen.
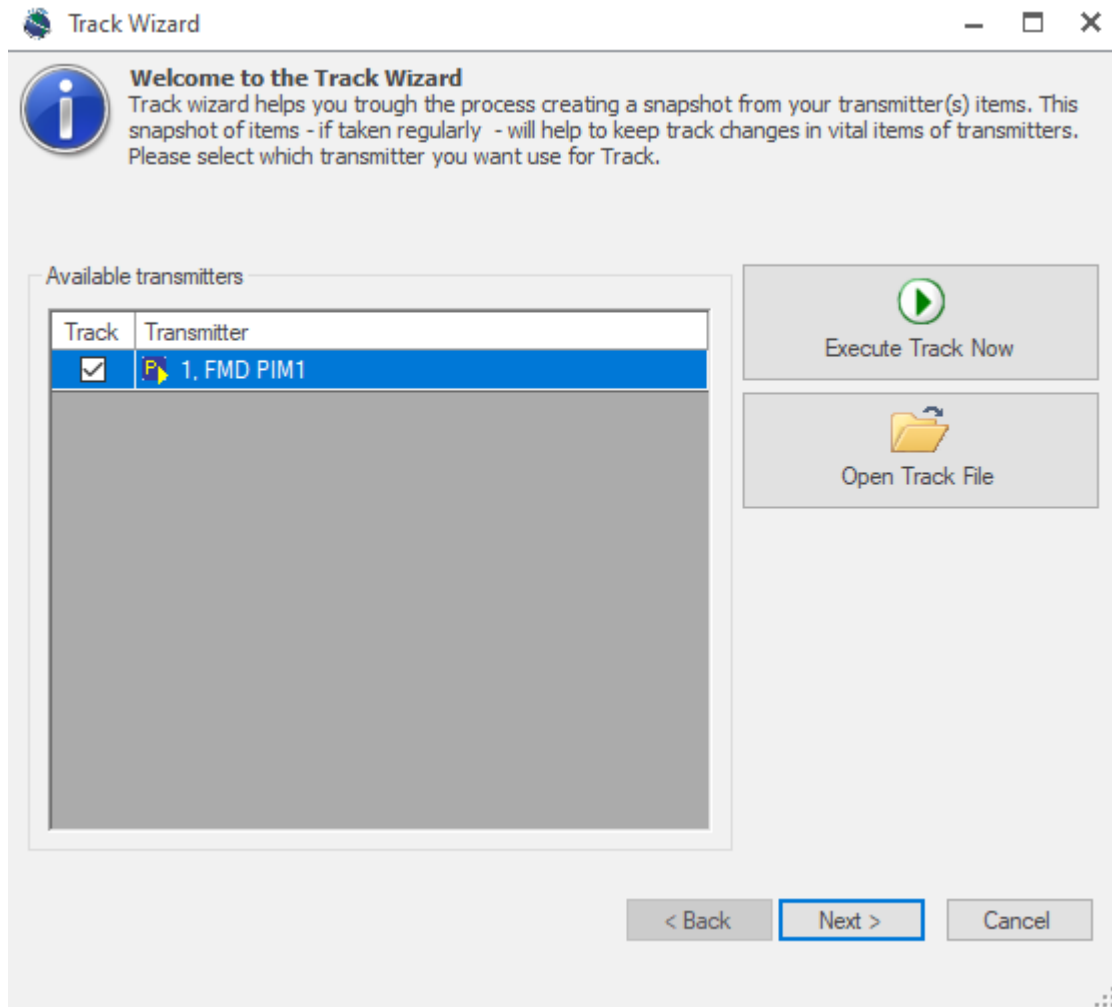
Execute Track Now: This will start a capture of the transmitter values.
Open Track File: This will open a previously saved track file for examination.
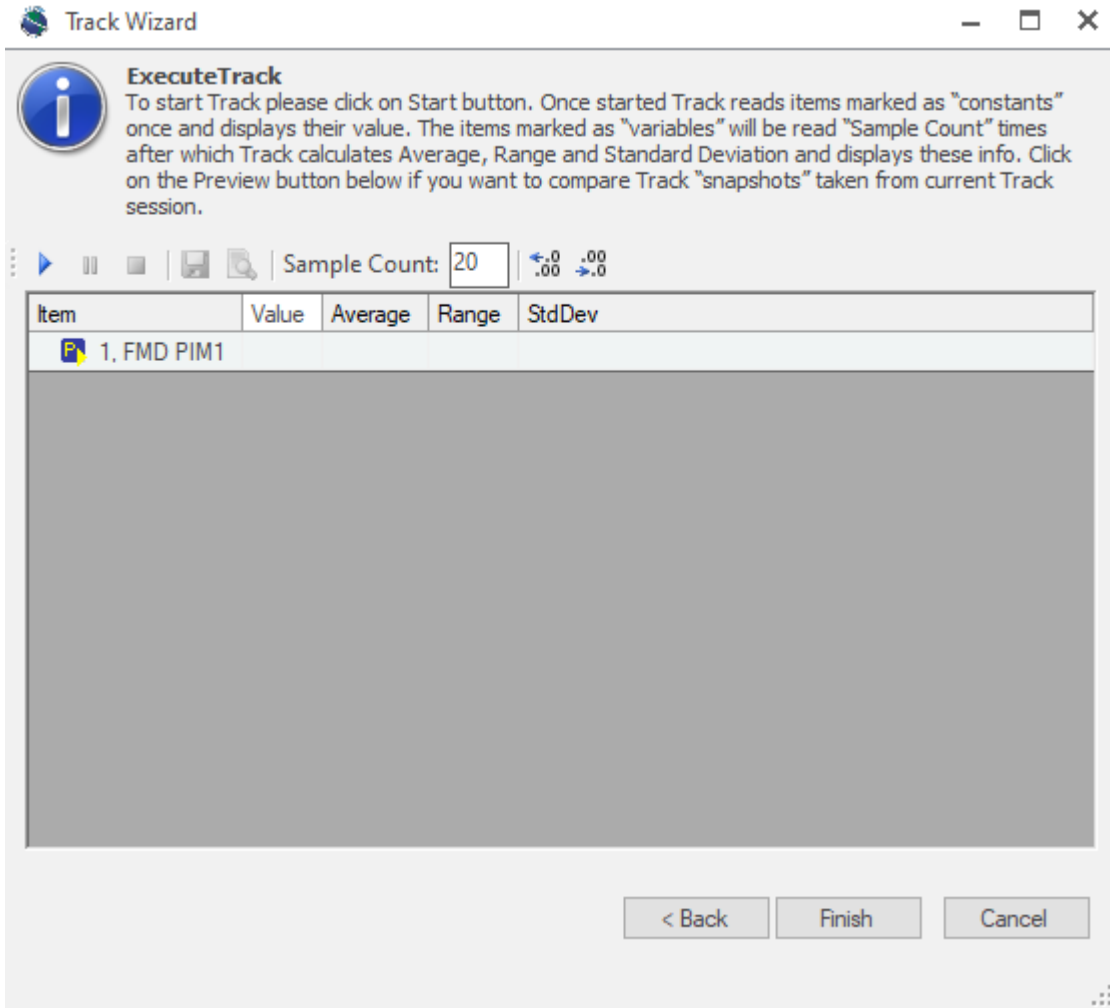
To start the track, press the play button. To stop the track, press the square button. The Sample Count is how many times the software will read values from the transmitter and store them.

Special Functions tab

PIM Views

Remote Display: Brings up a working simulation of a Remote Display unit.
Prover View: Shows the vital data of the prover at a glance.

PIM Usage History

Upload History: Gets the historical data from the transmitter.
Save: Saves the historical data to your local drive.
Print: Prints the historical data.
Delete: Clears the historical data from the transmitter.

PIM Browser

Capture Items: Opens the capture window.
New Capture: Lets you create a new capture set.
Open Capture: Opens a previously saved capture set.
Save Capture: Saves a capture set.
**Export capture:** Exports the capture data to Excel.
Setup Capture Session: Lets you edit the current capture setup.
Refresh Time: Sets the time to auto refresh the capture set regardless if a run is finished.
Start Capture: Starts the capture set.
Pause Capture: Pauses the capture set.
Stop Capture: Stops the capture set.
Increase Decimal Places: Increases the number of decimal places in the capture set.
Decrease Decimal Places: Decreases the number of decimal places in the capture set.
Update Capture Data: Asks the transmitter to resend the capture set.
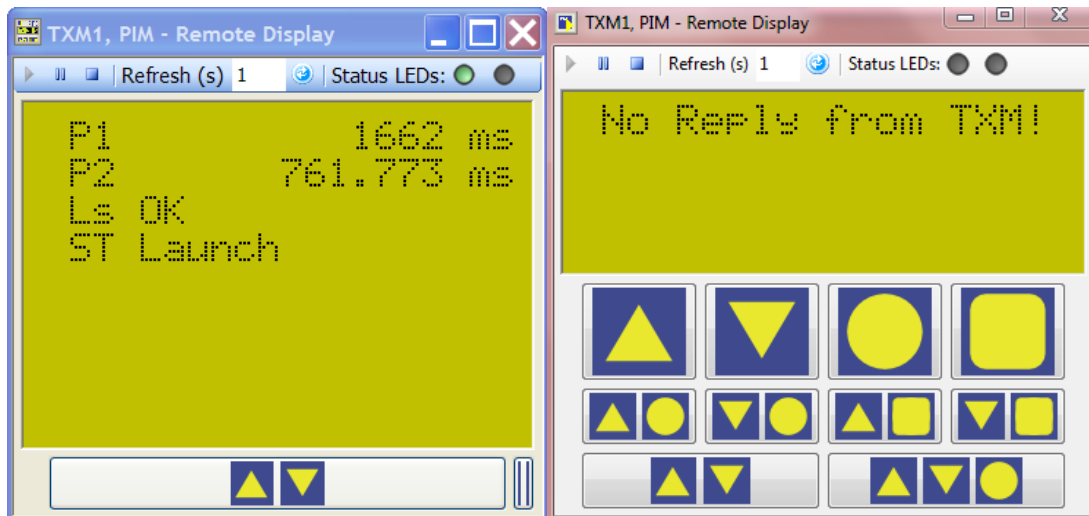**Auto Save:** Automatically saves the capture set.

PIM Views

Remote Display: Clicking the remote display button, shown below, from the ribbon initiates the display of PIM screen, as shown below.

NOTE: Depending on your computer and the graphics card used, your display may look like one of the two screens below.

Any information displayed on the PIM screen will also be shown on the remote display.

PIM Usage History.

Upload History: The historical information recorded by the PCS can be uploaded to spread sheets, such as MS Excel for further analysis. Once the data is uploaded, it can be manipulated to produce reports. The picture below shows an example.

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ID	Date/Time	Prover Cycle Count	Prover P1 Time	Prover P2 Time	Encoder V1	Encoder V2	Switch bar Temperature	Water Draw Mode	Encoder Dual Chronometr	Encoder V1 to V3 error	State	DP Minimum	DP Maximum	DP Average	Fluid Name
-	-		s	s	[-]	[-]	°C	-	[-]	-	bar	bar	bar	-	
1	10-04-2011	101	2.596247	1.304413	7.000	4.000	-47.6	?	6.946	-0.999	?				?
2	10-04-2011	102	2.727145	1.497183	7.000	4.000	-47.5	?	7.295	-0.999	?				?
3	10-04-2011	103	0.664948	0.287977	1.000	0.000	-47.5	?	1.779	-1.000	?				?
4	10-04-2011	104	2.686270	1.520774	7.000	4.000	-47.7	?	7.185	-0.999	?				?
5	10-04-2011	105	1.203120	0.368511	4.000	1.000	-47.6	?	3.217	-0.999	?				?
6	10-04-2011	106	3.719355	2.033232	10.000	5.000	-47.6	?	9.946	-0.998	?				?
7	10-04-2011	107	5.126657	2.681614	14.000	7.000	-47.6	?	13.707	-0.997	?				?
8	10-04-2011	108	7.011356	4.121913	19.000	11.000	-47.5	?	18.742	-0.996	?				?
9	10-04-2011	109	5.304280	3.025190	14.000	8.000	-47.6	?	14.176	-0.997	?				?
10	10-04-2011	110	0.251608	0.251608	1.000	0.000	-47.6	?	0.672	-1.000	?				?
11	10-04-2011	111	3.253457	1.765463	8.000	4.000	-47.6	?	8.689	-0.998	?				?
12	10-04-2011	112	0.000000	0.000000	8.000	4.000	-47.6	?	8.689	-0.998	?				?
13	10-04-2011	113	0.000000	0.000000	0.000	0.000	-47.7	?	8.689	-0.998	?				?
14	10-04-2011	114	10.172534	5.236878	0.000	14.000	-47.6	?	8.689	-0.998	?				?
15	10-04-2011	115	4.393480	2.981731	12.000	8.000	-47.6	?	11.747	-0.998	?				?
16	10-04-2011	116	3.711341	1.763337	10.000	5.000	-47.7	?	9.920	-0.998	?				?
17	10-04-2011	117	3.716022	2.097990	10.000	6.000	-47.4	?	9.928	-0.998	?				?
18	10-04-2011	118	1.670156	0.812905	5.000	3.000	-47.6	?	4.461	-0.999	?				?
19	10-04-2011	119	0.000000	0.000000	5.000	3.000	-47.6	?	4.461	-0.999	?				?
20	11-05-2011	120	1.459715	0.706251	4.000	2.000	-47.6	?	3.892	-0.999	?				?
21	11-05-2011	121	1.436298	0.819596	0.000	2.000	-47.6	?	3.892	-0.999	?				?
22	11-05-2011	122	0.000000	0.000000	0.000	2.000	-47.7	?	3.892	-0.999	?				?
23	11-05-2011	123	2.001072	0.994982	6.000	3.000	-47.6	?	5.332	-0.999	?				?
24	11-05-2011	124	1.175044	0.540397	3.000	1.000	-47.6	?	3.131	-0.999	?				?
25	11-05-2011	125	1.242382	0.630572	4.000	2.000	-47.6	?	3.311	-0.999	?				?
26	11-05-2011	126	0.000000	0.000000	4.000	2.000	-47.6	?	3.311	-0.999	?				?
27	11-05-2011	127	1.362582	0.678501	3.000	2.000	-47.6	?	3.630	-0.999	?				?
28	11-05-2011	128	1.287775	0.652848	3.000	2.000	-47.6	?	3.431	-0.999	?				?
29	11-05-2011	129	1.488443	0.723617	4.000	2.000	-47.2	?	3.966	-0.999	?				?
30	11-05-2011	130	1.337272	0.675187	3.000	2.000	-47.6	?	3.563	-0.999	?				?

Other functions for PIM usage history

As well as being able to upload the PIM usage history log to programs such as MS Excel, the operator can save the data and print it or delete it. These functions are achieved by selecting the icons in the PIM Usage History ribbon.
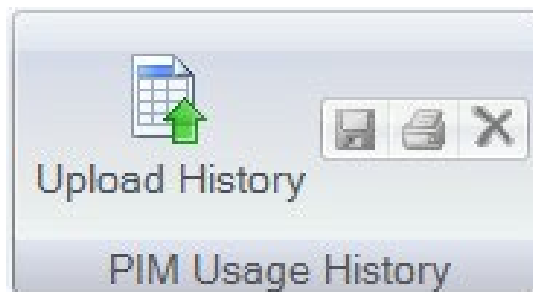
Prover View: Pressing the Prover View icon under the Special Functions tab displays the following window:

The left column of this page shows all the measurement of the prover at a specific temperature. The displayed values can be in metric or imperial measurements.

NOTE: For purposes of clarity, it is advisable that the same measurement system is used throughout and not a mix of imperial and metric units. This will not have any effect on the operation and accuracy of the data produced by the PCS. However, it makes it easier to follow from an observer's point of view.

By right clicking the mouse button on any of the measurements on the left-hand side, you will see a pop-up menu which will allow you to change the measurement as well as allowing you to refresh the screen and adjust the number of decimal points you desire to see.

The window at the bottom of left-hand column shows the selected row and an explanation of what has been selected. The picture above it shows item 223, which has the title TAG (just below first line "Measurement Tube Data - referred 20C"), with the explanation of "Tag for prover".

The right-hand column is the information relating to run data. Most of this is either measured (i.e., times between optical switches) or calculated (e.g., flow rates). By right clicking the mouse on any one of the data fields, you will have a pop-up menu allowing you to choose from several measurement units (e.g., in the case of "Corrected test volume" you can see the measurement in liters, cubic meters, gallons or barrels).

The window at the bottom of the right-hand column shows the selected row and an explanation of what has been selected. The picture above it shows item 70, Prover Cycle Count, with the explanation "Total prover cycles".

NOTE: If the bottom windows (left and right columns) do not appear, you will need to point the cursor to the inner edge of the bottom of the window, click and hold the mouse button, then drag it upwards to make these two windows visible. This is a similar operation to sizing any window.

PIM Browser

Capture Items: Allows the user to capture the data from multiple prover runs. This is the default view.
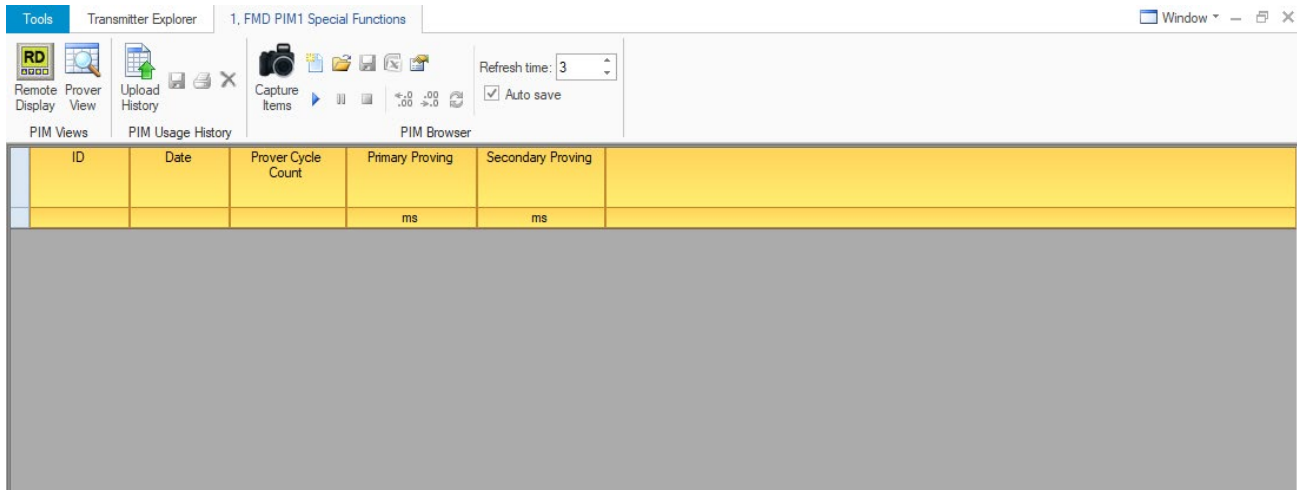
You can add or change items by clicking the Setup icon that looks like a hand holding paper.
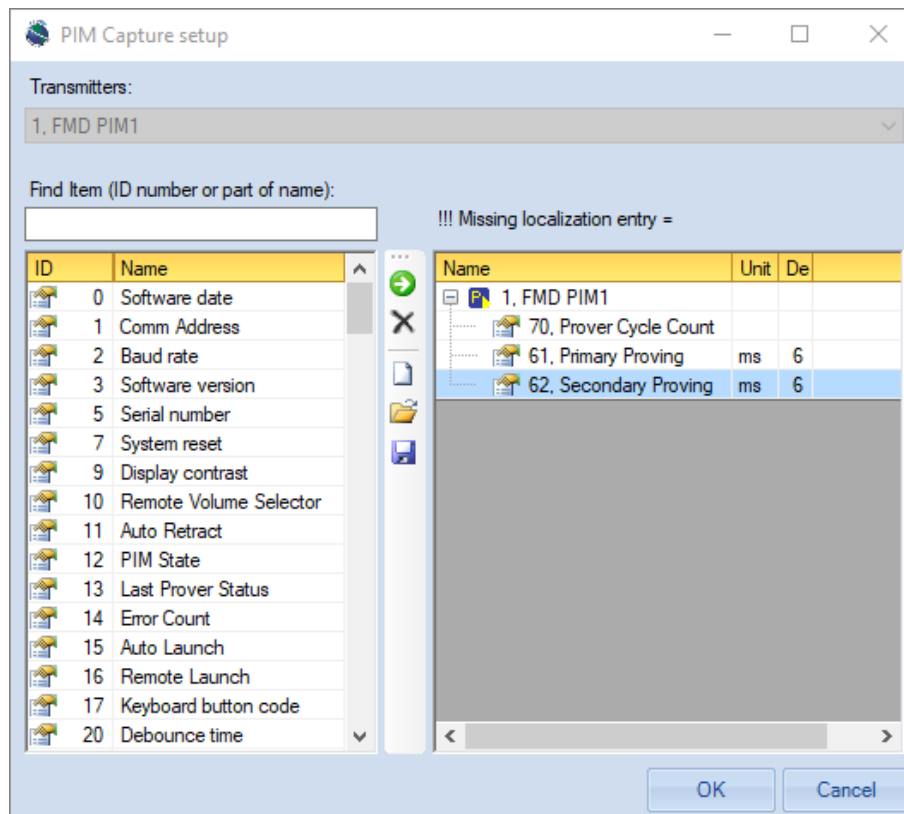
Once you have the items you want to capture added, press the Start button that looks like a triangle. The software will wait for the next prover cycle to start and end and then it will capture the data that you requested. After the first capture is complete it will ask you to save the file like below.
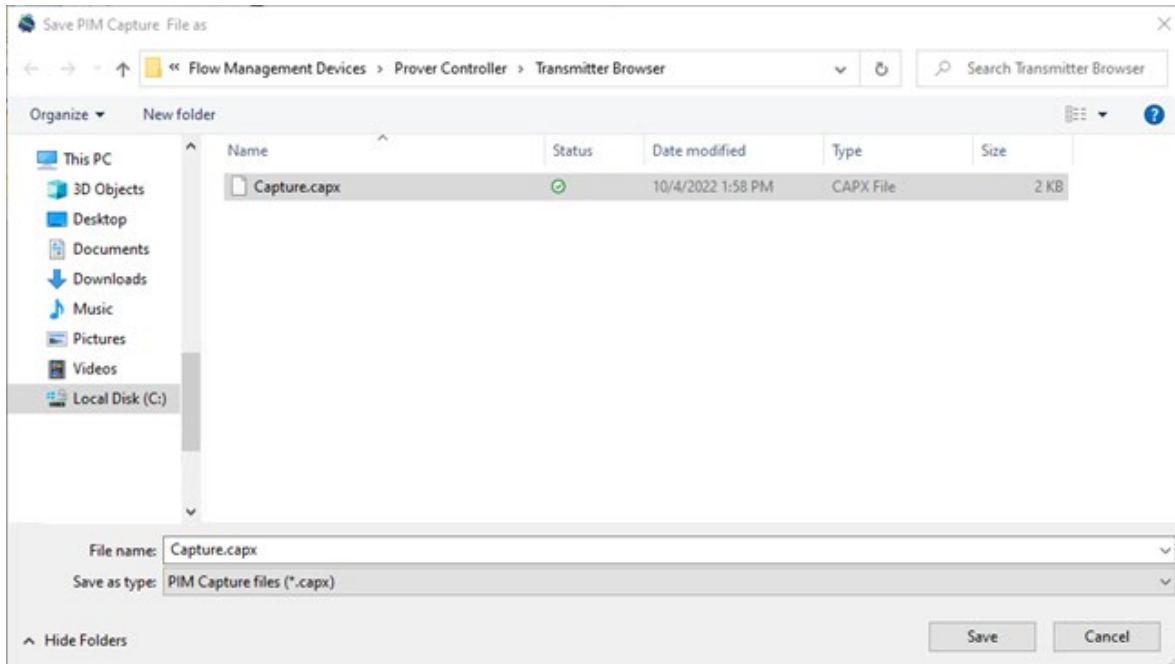
A few prover cycles will look similar to the image below.

	ID	Date	Prover Cycle Count	Primary Proving	Secondary Proving
				ms	ms
	1	4/2022 14:36:50	164	2807.251215	1088.743687
	2	4/2022 14:37:11	165	1307.832956	733.902693
	3	4/2022 14:37:20	166	1038.013458	556.485116
	4	4/2022 14:37:33	167	897.884130	444.994539

When you are done, press the Stop icon that looks like a square. The software has saved your data to the file that you specified earlier.

To export your data to Excel for further study, press the Excel icon. It will prompt you to enter the filename to save as, then open the file in Excel if you have it on your computer.